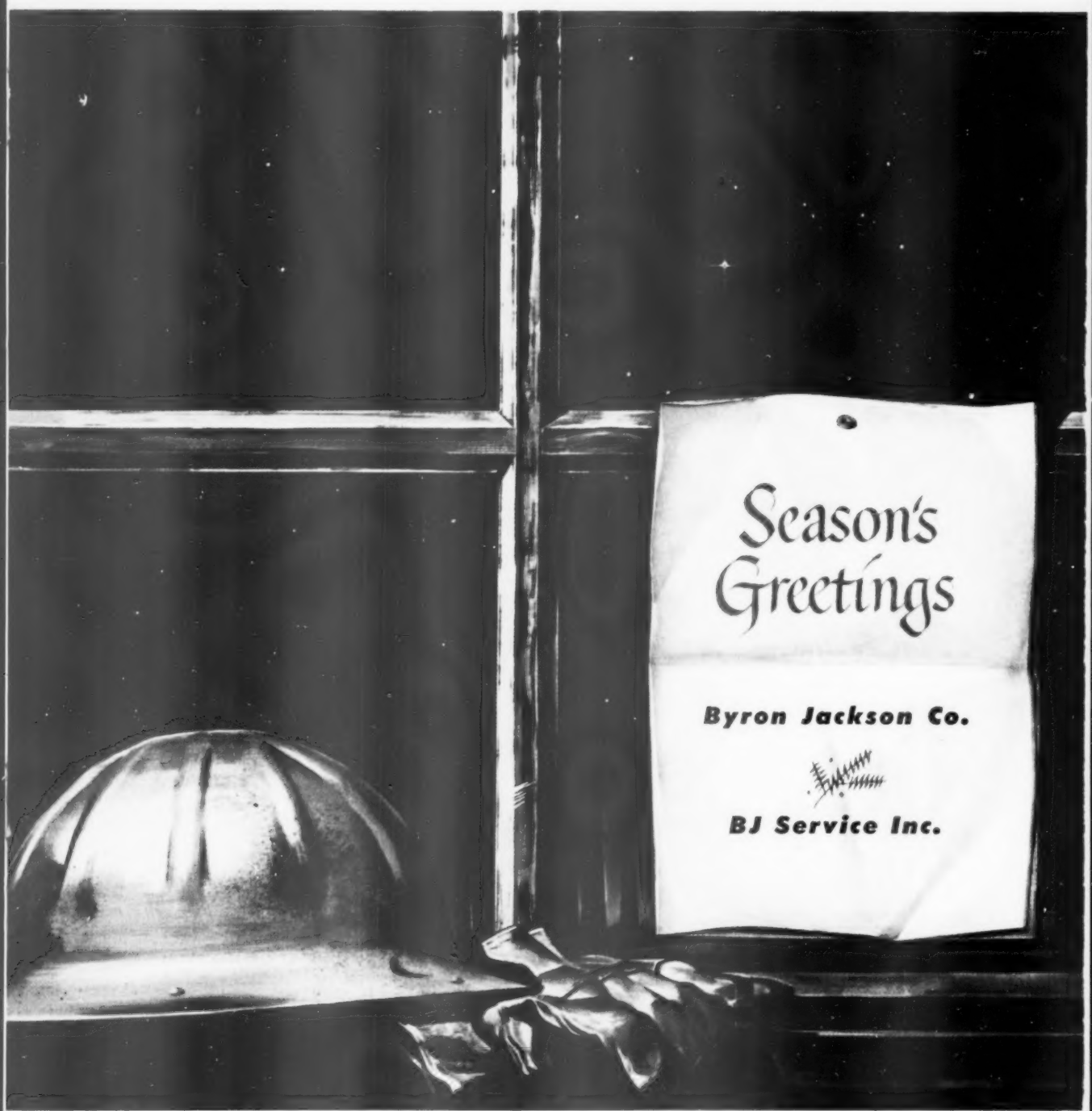
the WORLD-WIDE OIL AND GAS JOURNAL



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4192

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HOUSTON 1, TEXAS

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DECEMBER 21, 1953 VOL. 52 NO. 33

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In Brief . . .

The Journal's international oil survey shows that 57.8 per cent of the world's known oil reserves of 135 billion barrels is now concentrated in the Middle East. The three main Middle East producing countries of Saudi Arabia, Kuwait, and Iraq are estimated to have total reserves of some 61 billion barrels, or 48.5 per cent of the Free World total. Only 21.5 per cent of the world's total is now estimated to be in the United States.

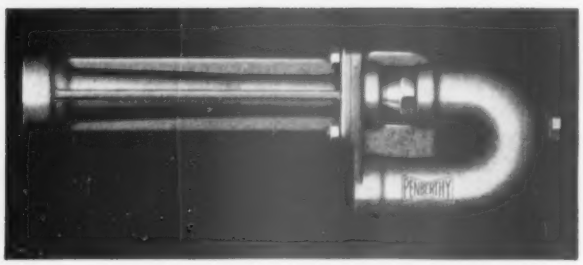
Four years ago the Middle East contained 41.6 per cent of the total known world reserves of 78.3 billion barrels, while the United States accounted for 35.0 per cent of the total.

Present estimates of the crude-oil reserves of the non-Communist countries total nearly 126 billion barrels. These combined reserves are now equal to approximately a 29-year supply at current consumption. Reserves of Russia and its satellites are estimated to total just over 9 billion barrels.

There are now more than 509,000 producing oil wells in the world, with average production totaling more than 11 million barrels daily. There are currently some 6,000 wells drilling.

World-wide refining operations are carried out in some 661 refineries, with combined capacities for processing 15.5 million barrels of crude daily. Thermal cracking capacity totals more than 4 million barrels daily, while catalytic cracking facilities can handle some 3.7 million barrels daily.

There's Certain satisfaction in PRODUCTS BY PENBERTHY



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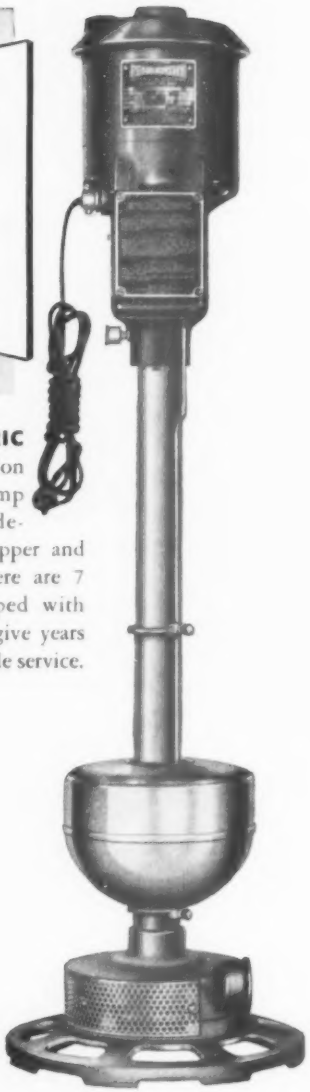

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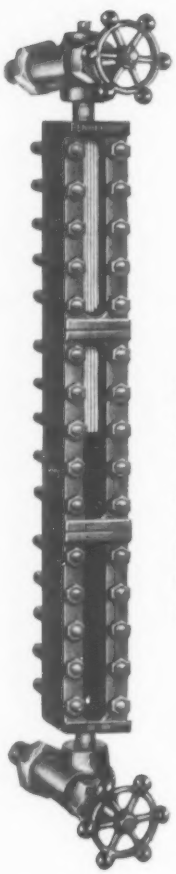

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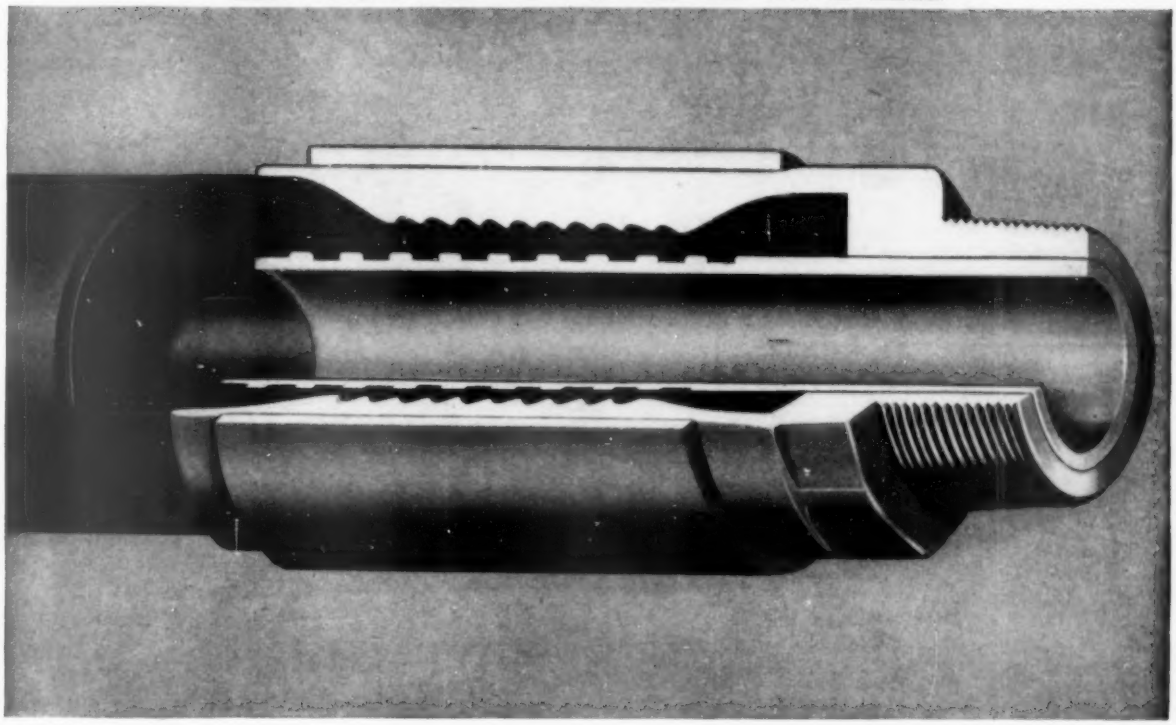

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No drilling pressure is high enough to put a leak in a B. F. Goodrich Permalock hose coupling—nor budge it even a fraction of an inch from the bulldog grip its teeth sink into the hose end.

Applied to rotary drilling hose under hydraulic pressure, the Permalock coupling is *permanently* secured by a powerful lock ring so it can never tear loose nor weaken.

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B. F. Goodrich Highflex rotary drilling hose with Permalock couplings is available at leading supply houses in the major drilling areas, or you can get it anytime—day or night—from one of these B. F. Goodrich warehouses: Dallas, Houston, Kilgore, Odessa, Wichita Falls, Great Bend, Oklahoma City, Tulsa, Williston, Denver and Los Angeles.

If you would like further information on the Permalock coupling, hose, or any of the products B. F. Goodrich makes for the oil field, send the coupon below.

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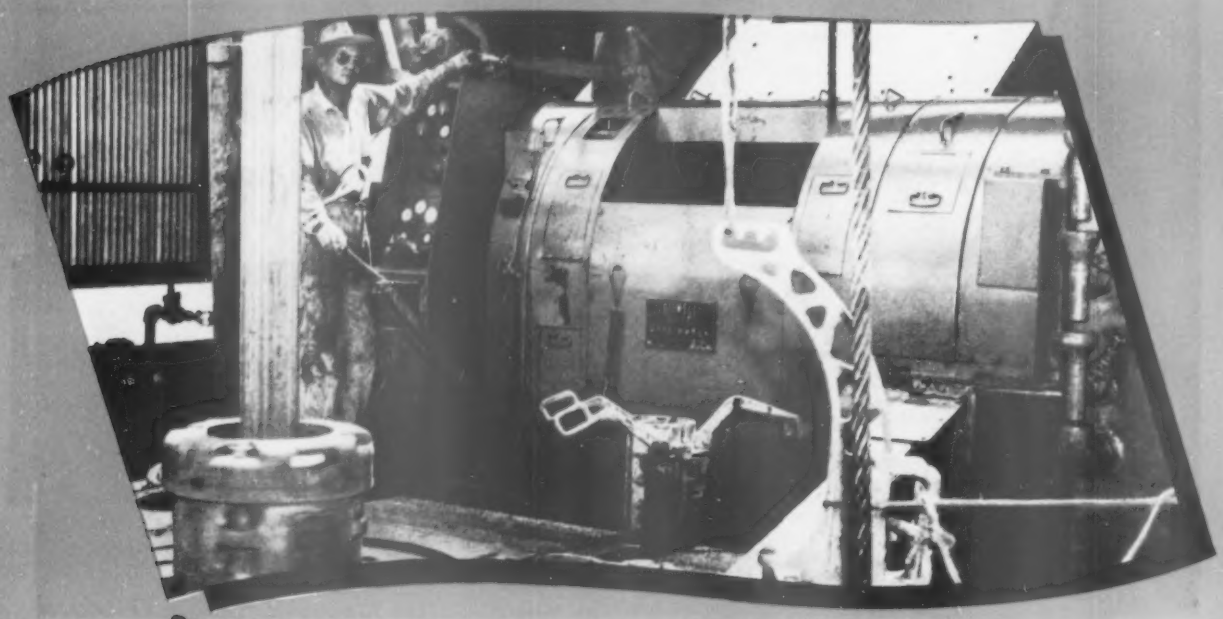

"Oilwell" No. 76 Rigs

*They Stay BUSY!

Contractors tell us that their "Oilwell" No. 76 Rigs operate over a wider depth range than any other rigs they own. Choice of a two or three-engine drive, with one or two pump take-offs, permits the most efficient use of input horse-power. That is why No. 76 Rigs can be used economically on wells from 6,000 to 10,000 feet . . . or deeper with 3½ inch drill pipe.

*They Operate ECONOMICALLY!

In the Beaver Lodge field of North Dakota, an "Oilwell" No. 76 Rig, owned by Noble Drilling Corporation, has drilled nine wells in approximately nine months for Amerada. Eight of these wells were completed around 8,500 feet and the ninth well went down to around 12,000 feet. Maintenance costs were reported as "very small." With compact, unitized assemblies and simplified controls, the margin of safety and the performance capacity of this rig are greater than other models of comparable size and weight.

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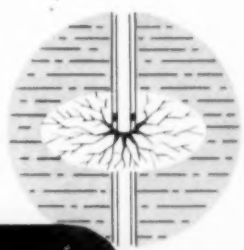
Hydrafrac Service has proved its worth in re-vitalizing tired wells. Now it is gaining importance as a completion process for new wells. Operators find it is more economical to use the service while the rig is over the hole, postponing the time when extra stimulation is needed.

Call on the big experience of Halliburton technicians to learn without charge if this valuable service can aid you in boosting potential recovery. Just phone Halliburton's local or district office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.



Hydrafrac – Reg. U.S. Pat. Off.

HALLIBURTON

YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!

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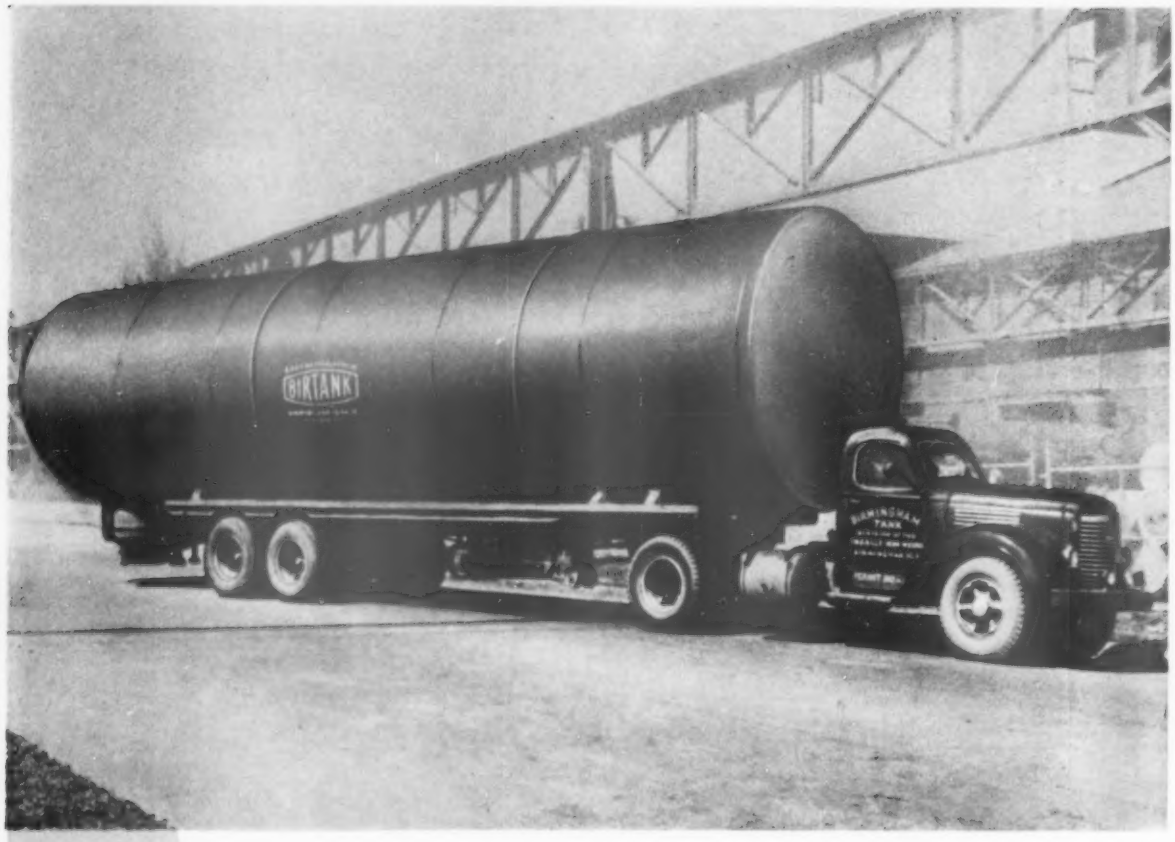

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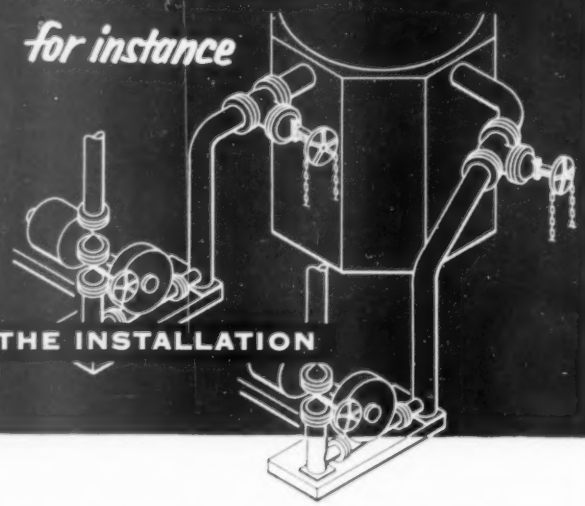
...in a Butadiene Plant, for instance



THE INSTALLATION

At a Southwestern butadiene plant, using Crane 18-inch steel gate valves on suction lines from extractive distillation towers to pumps. Working pressure, 90 psi, 250 to 300 deg. F.

VALVE SERVICE RATINGS

SUITABILITY:	Have what the job takes
FEATURES:	Expelloy seating
MAINTENANCE COST:	Zero
SERVICE LIFE:	Installed 1951-long life ahead
OPERATING RESULT:	Valve efficiency restored
AVAILABILITY:	Catalog item—No. 33X

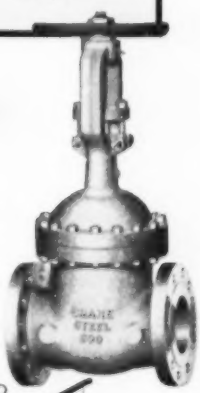
THE CASE HISTORY

Original valves in this service were lubricated plug valves, but they couldn't be made to seat tightly on the light hydro-carbons and furfural mixture. Their continual leakage burdened the plant with excessive maintenance, and a constant threat to process control. All these lubricated plug valves were replaced with Crane 33X steel wedge gate valves.

Installed more than 2 years ago, the Crane valves completely remedied the leakage trouble, and to date, none have required any maintenance whatsoever. They keep working perfectly with but prescribed routine care.

THE VALVE

Product of pioneer skill in steel casting, and with a long record of service to petroleum and petrochemical industries, Crane steel valves stand apart from the ordinary. Yet they actually cost less for service delivered. Choose from the widest range of body and trim materials; in all pressure classes, sizes; flanged, screwed, or welding ends. See your Crane Catalog.



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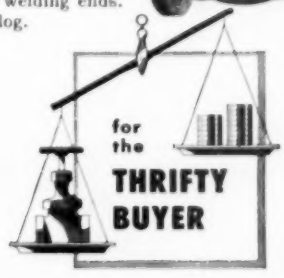
CRANE VALVES



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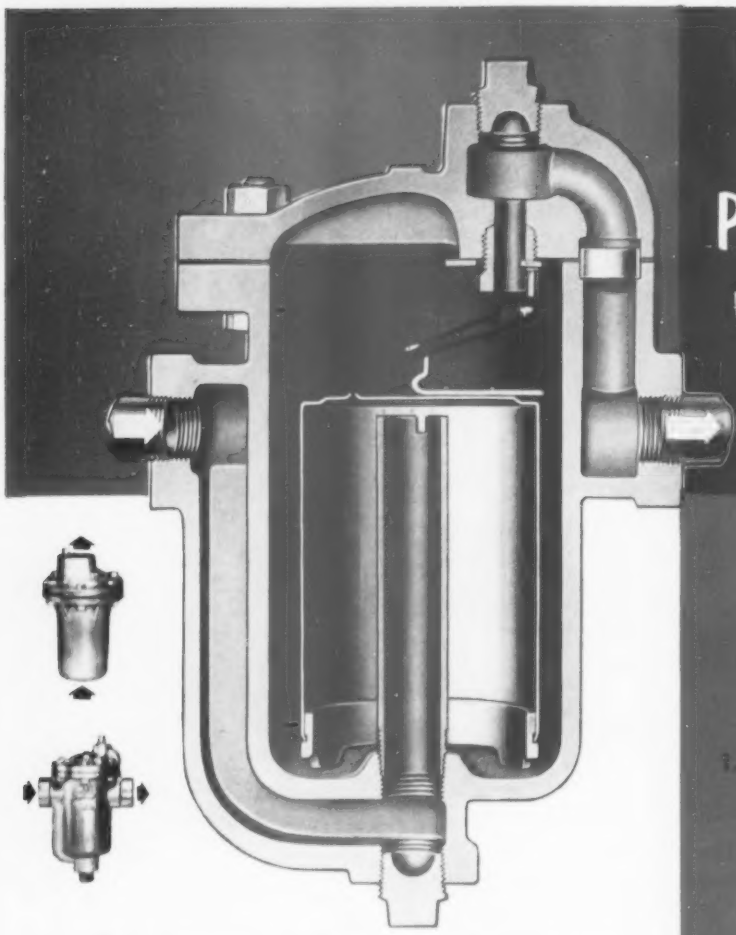
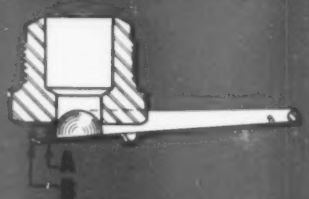
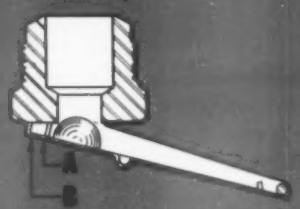


MORE TRAP CAPACITY PER DOLLAR with Armstrong two-phase leverage

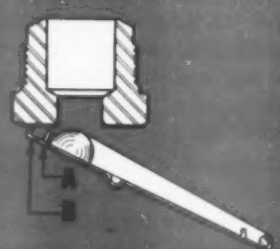
HOW IT WORKS:



1. Valve in closed position.



2. As the bucket starts to sink, the lever fulcrums at "A", giving high leverage to open the valve against pressure. When valve is well open, the secondary fulcrum "B" touches the face of the valve seat.



3. Additional bucket travel results in fulcrum "B" becoming the pivot, permitting the valve to be opened wider so that restriction to flow of condensate is minimized.

Two-phase steam trap leverage is an original development by Armstrong and has been incorporated in Armstrong traps since the memory of most engineers runneth not to the contrary. It provides:

1. High initial leverage to open the valve against pressure.
2. Secondary lower leverage which permits the valve to travel well clear of the seat to minimize restriction to flow of condensate.

A single-phase lever can open just as large a valve *or* give just as great valve travel, *but not both.* Thus, Armstrong two-phase leverage gives very much greater capacity, depending on trap size than the earlier leverage system.

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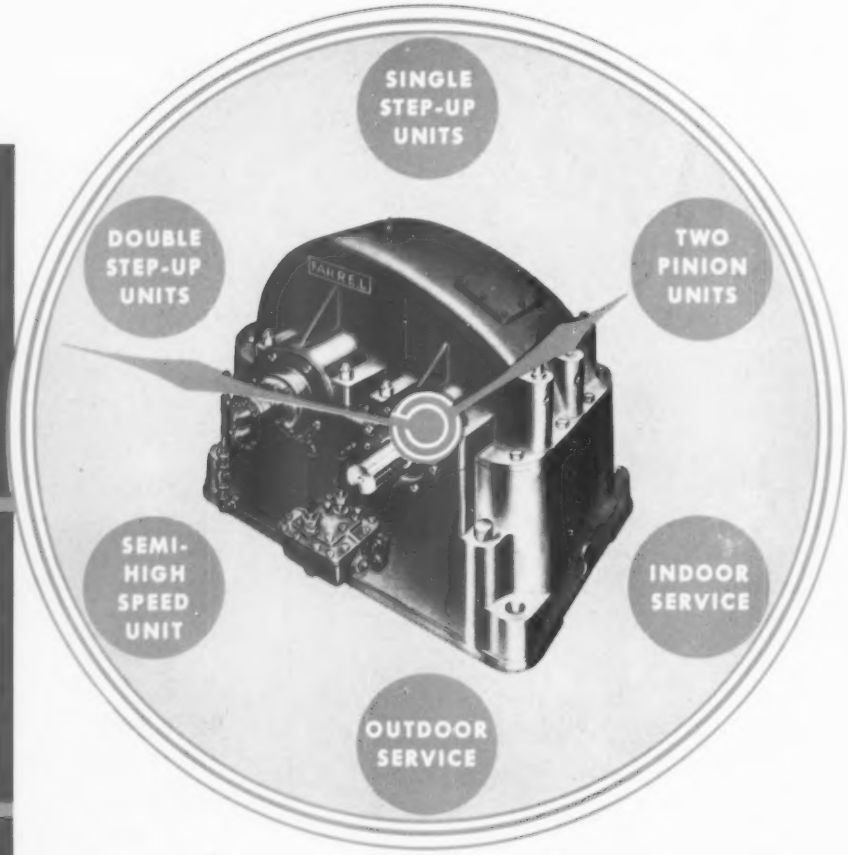

Farrel Type SI units are built in a standard line, consisting of 49 sizes.

Single step-up units have ratios ranging from 1:1 to 12:1. Where higher ratios are required, double step-up units are supplied with ratio range from 12:1 to 40:1.

Two-pinion units, designed to transmit power from a single engine to two pumps are also available.

When requirements fall between the range of Type SI units and standard commercial speed reducers, Farrel semi-high speed units are recommended.

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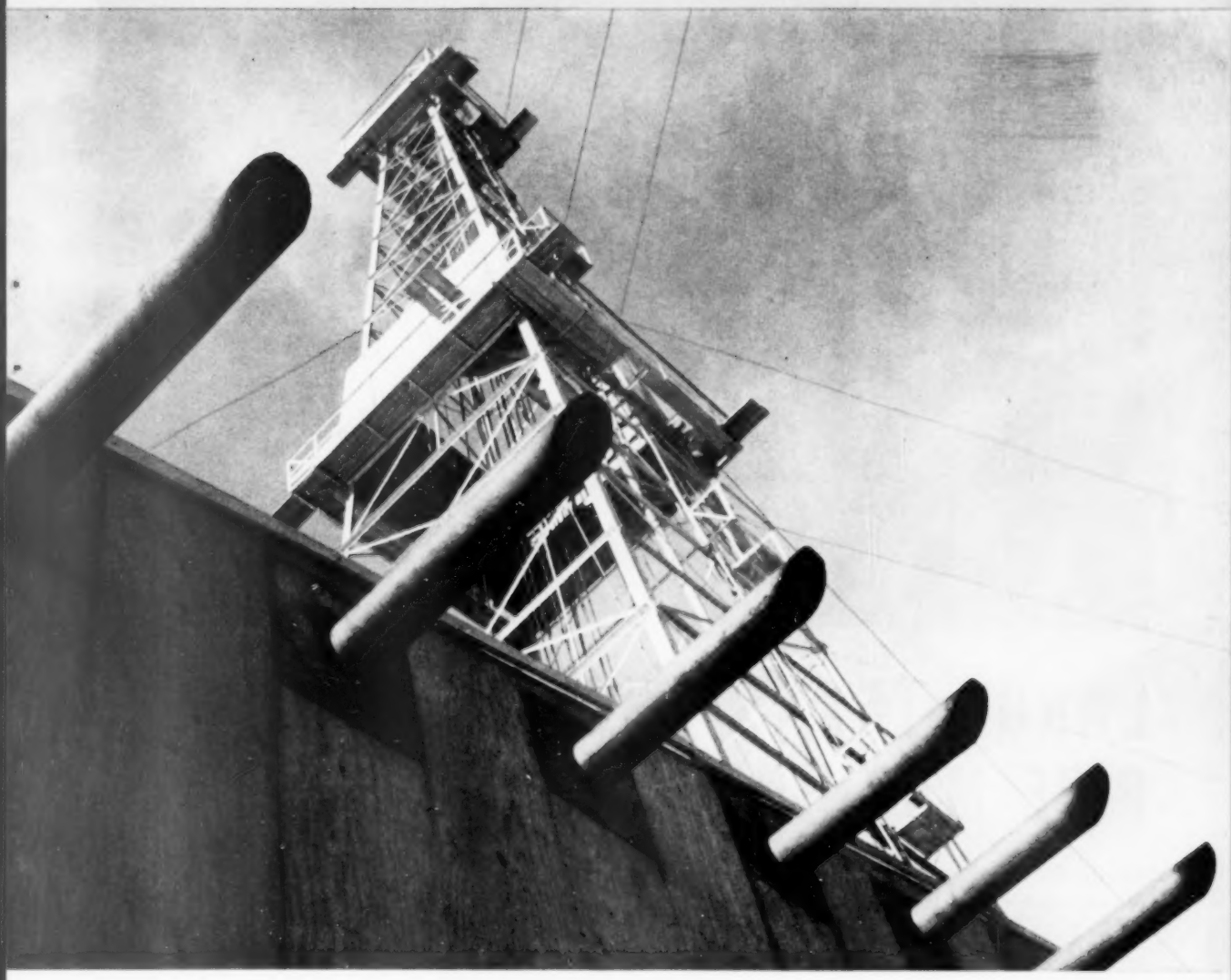
Three D386s on the firing line at Pincher Creek



Three V-type Caterpillar D386 Diesels were selected to power this rig at Pincher Creek, Alberta, Canada, because of their ability to produce in rugged going. Look at the conditions they work under, 24 hours a day, 365 days a year:

Temperatures from -30° to 80° F make Pincher Creek "one of the toughest fields to drill in."

Authority for the last statement is N. Cairns, tool pusher for Commonwealth Drilling Co., which owns the rig. He explains: "Very hard formations which slope make it difficult to keep the hole straight. We are drilling to 13,000 or 15,000 feet through Madison lime. It's one of the toughest fields but *we find the D386s very reliable.*"

Top to bottom drilling takes approximately one year. "When we are pulling out of the hole at deep depths," continues Mr. Cairns, "we compound the three engines on the drawworks and have ample power. At over 11,000 feet we can make a round trip in less than 8 hours and still make some hole on the shift."

These reliable Cat* D386 Oilfield Engines power two slush pumps and a National Drawworks, a converted steam unit which is one of the largest in Canada.

Next time specify trouble-free Cat Oilfield Engines for your rigs. Leading manufacturers of oilfield equipment can supply them. And when it's time to re-power, it's time to see your Caterpillar Dealer. He has the right engines for your job and an unmatched reputation for quick, round-the-clock service anywhere.

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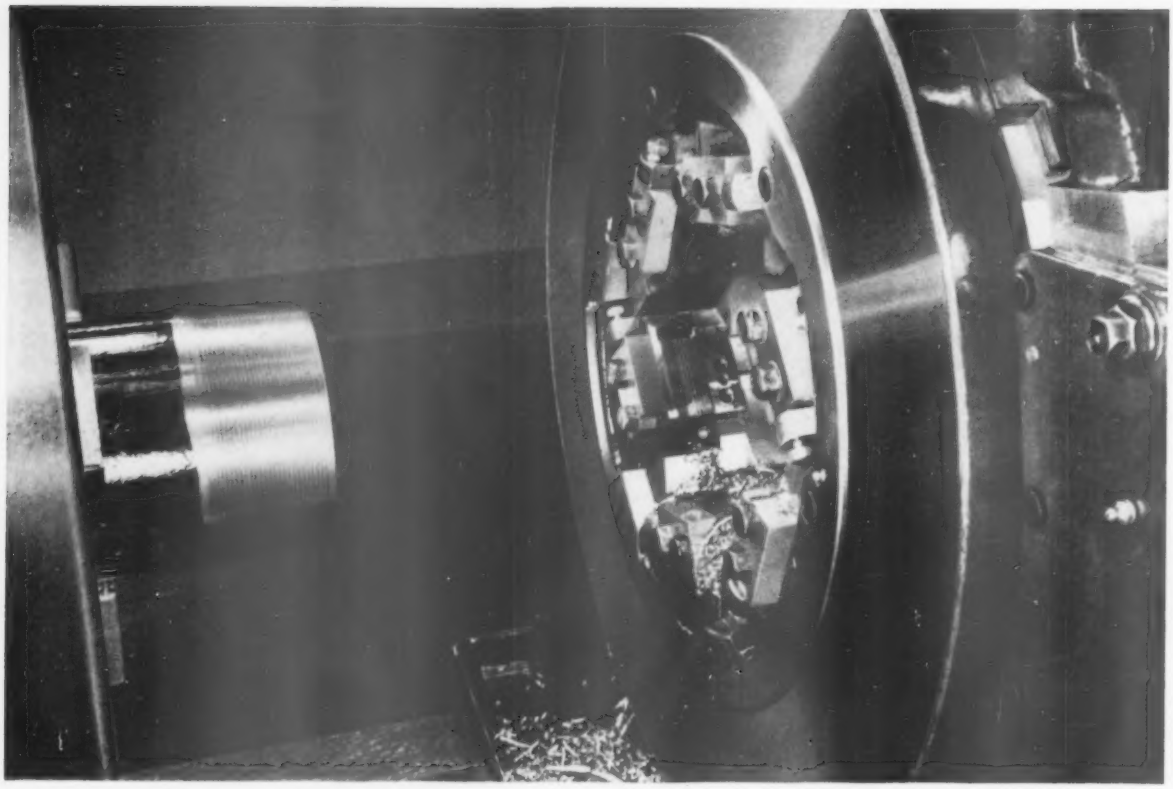


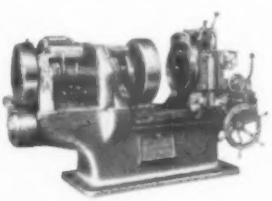
LARGE TEXAS SHOP USES LANDIS PIPE MACHINES *Exclusively* . . . .

TEN LANDIS Receding Chaser Pipe Threading Machines are used by Atlas Pipe, Inc., largest mill-type pipe finishers on the Gulf Coast, for threading oil tubular goods.

These machines are installed in an offset position so as to permit uninterrupted production. Typical production figures show: the 4¾" machines threading 74 joints (148 threads) per hour from 2⅜" upset tubing—the 8⅝" machines averaging 20 joints (40 threads) per hour from 5½' casing. All threads are 8 pitch to API standards.

Mr. Becker, Plant Manager, highlights the important production advantages of LANDIS Pipe Machines when he says that they were selected for their flexibility, versatility, and the uniform threads produced. Thread uniformity is made possible by massive construction, leadscrew control of the carriage movement, a precision-built die head featuring LANDIS Tangential Chasers, and an attachment which mechanically controls the degree of taper.

These machines offer flexibility through wide range coverage—three sizes of machines (4¾", 8⅝", 13⅜") thread all pipe sizes from 1⅝" to 13⅜".



Ease of set-up is also important — a change of diameter and length in less than two minutes, a complete change for diameter, pitch, taper, and length in 40 minutes.

LANDIS Receding Pipe Machines perform four other pipe fabricating operations in addition to threading: cutting off, chamfering, reaming, and the making and breaking of collars. For more information, write for Bulletin C-77.

378

THE LANDIS *Machine* CO. 50TH ANNIVERSARY **WAYNESBORO PENNSYLVANIA**

THE WORLD'S LARGEST MANUFACTURERS OF THREAD GENERATING EQUIPMENT

Represented in the Domestic Oil Fields by: Colcord-Wright Machinery & Supply Co., St. Louis, Mo.; C. J. Harter Machinery, Houston, Texas; Frederic-Baker Co., New Orleans, La.; Moore Machinery Co., Los Angeles and San Francisco, Calif.; Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo.

Facts prove the economy of RUST-OLEUM®

Apply Directly Over Sound Rusted Surfaces

Just scrape and wirebrush to remove rust scale and loose particles — then brush Rust-Oleum 769 Damp-Proof Red Primer *directly over sound rusted surface.*

Lasts Longer Applied Directly Over Rust

Sandblasting, chemical pre-cleaning and other costly preparation methods are *not* usually required. Rust-Oleum penetrates the rust to bare metal, incorporating the rust particles into the coating.

Many Colors, Including Aluminum, and White

Rust-Oleum finish coatings incorporate the same basic rust-inhibiting vehicle as Rust-Oleum 769 Damp-Proof Red Primer. They provide *double protection* and enable you to *beautify as you protect.*

Practical Answer to Your Rust-Producing Conditions

Rust-Oleum resists rain, snow, heat, fumes, sun, salt water, and chemicals. So easy to use by brush, dip, or spray that one man often does the work of *two.*

Proved Throughout Industry for Over 25 Years

Indoors and out, Rust-Oleum has *proved* its capacity to stop rust! Rust-Oleum can do the same for your tanks, metal sash, stacks, girders, roofs, buildings, machinery, pipes, etc.

An Exclusive Formula

Rust-Oleum is *distinctive* as your fingerprint. It incorporates a specially-processed fish oil vehicle that *dries,* is *odor-free,* and is formulated in *many colors.* Specify Rust-Oleum — accept no substitutes.

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swing joints

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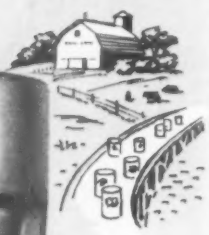
YOU CAN ALWAYS DEPEND ON . . . . .

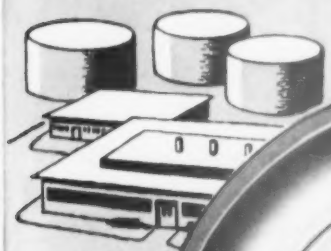
for unlimited flow line flexibility, greater load carrying capacity!

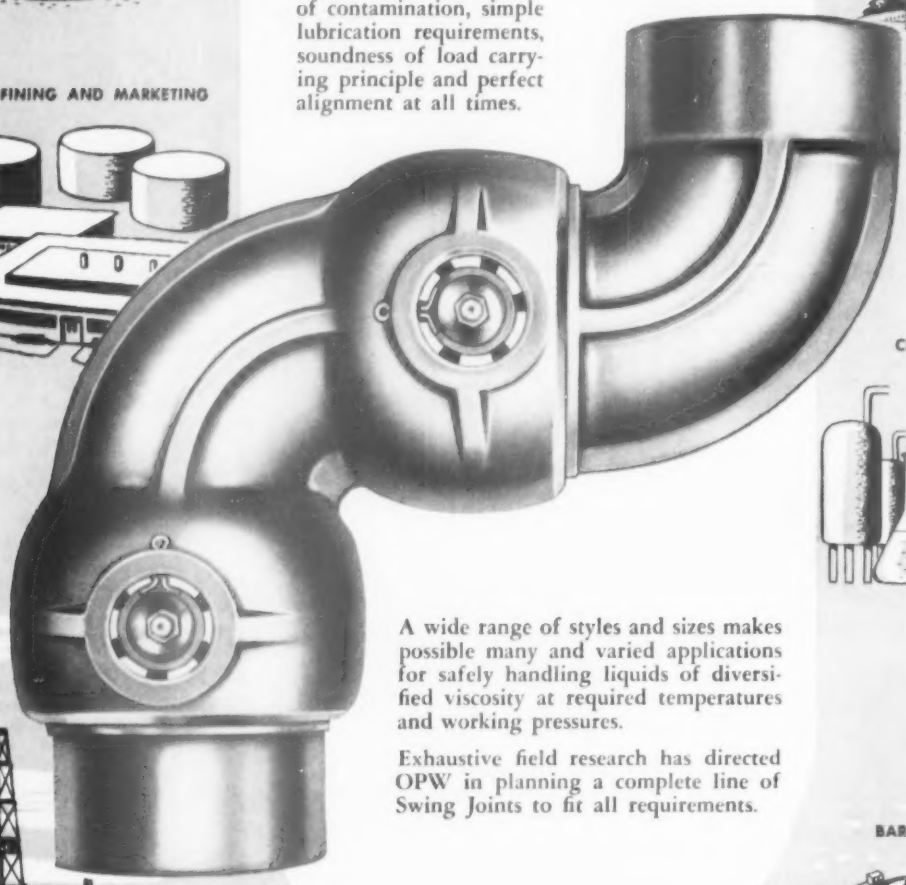
The high standard of OPW's Swing Joint performance results from expert designing, precision machining, exclusion of contamination, simple lubrication requirements, soundness of load carrying principle and perfect alignment at all times.

FOOD PROCESSING

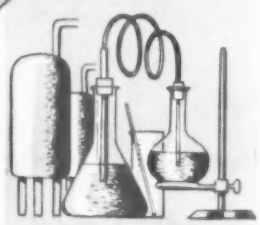


OIL REFINING AND MARKETING





CHEMICALS

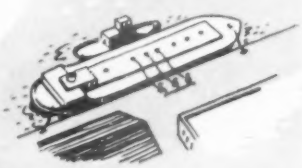


A wide range of styles and sizes makes possible many and varied applications for safely handling liquids of diversified viscosity at required temperatures and working pressures.

Exhaustive field research has directed OPW in planning a complete line of Swing Joints to fit all requirements.

OIL DRILLING

BARGE LOADING



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ENGINEERING News

JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT • ROTAMETERS • FLOW INDICATORS • RADIAFIN TUBES • VALVES • SPRAY NOZZLES AND ATOMIZERS • GEAR PUMPS • DESUPERHEATERS

Here's SK's NEWEST DESIGN for Rate-of-Flow Measurement—the SAFEGUARD ROTAMETER

As an answer to industry's increasing demands for *safety* and *convenience* in rate-of-flow measurement of liquids and gases, SK has designed its newest Rotameter—the Safeguard Rotameter.

This Rotameter has specific application for measurement in the higher temperatures and pressures of modern process technology, or where dangerous or valuable liquids and gases are being used.

FOR SAFETY:

The completely enclosed steel meter case has detachable safety glass windows, protects the metering tube from external shock, and also protects the operator if accidental tube breakage occurs.

FOR CONVENIENCE:

Wider front and rear sight glass windows give maximum visibility. The detachable metal reference scale can be supplied in either units of flow or in millimeters for use with calibration charts, as desired.

Extreme construction rigidity gives precise end fitting alignment, eliminates pipe stresses on the tube.

Can be adapted for remote recording and controlling of fluid rate of flow.

Write for full information, including sizes and capacities, on this newest Rotameter design.

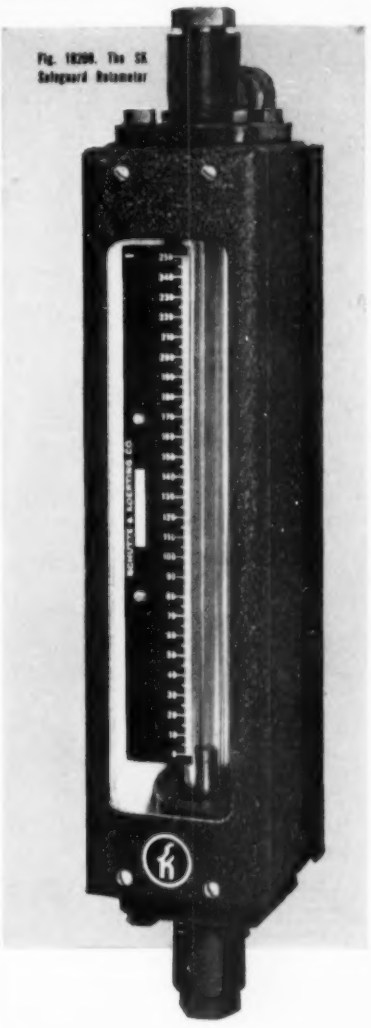

Fig. 18208. The SK Safeguard Rotameter

Glass metering tube has cylindrical inlet and outlet pieces of the *same outside diameter* — allowing use of the same size packing rings on either end of the tube.

Horizontal inlet and outlet can be connected in four different positions.

Two types of metal mandrel made tubes are available—the "HCF," a High Capacity Fluted tube, or the "R," a conical tapered tube without flutes.

Various rotor designs and materials permit wide capacity range within one meter.

End fittings are available in cast iron, bronze, and stainless steel.

Neoprene packing gives corrosion resistance, tight seal, long service life. Other packing material is available.

Rotor removal and tube cleaning without dismantling easily done through non-leaking seated clean-out plug.

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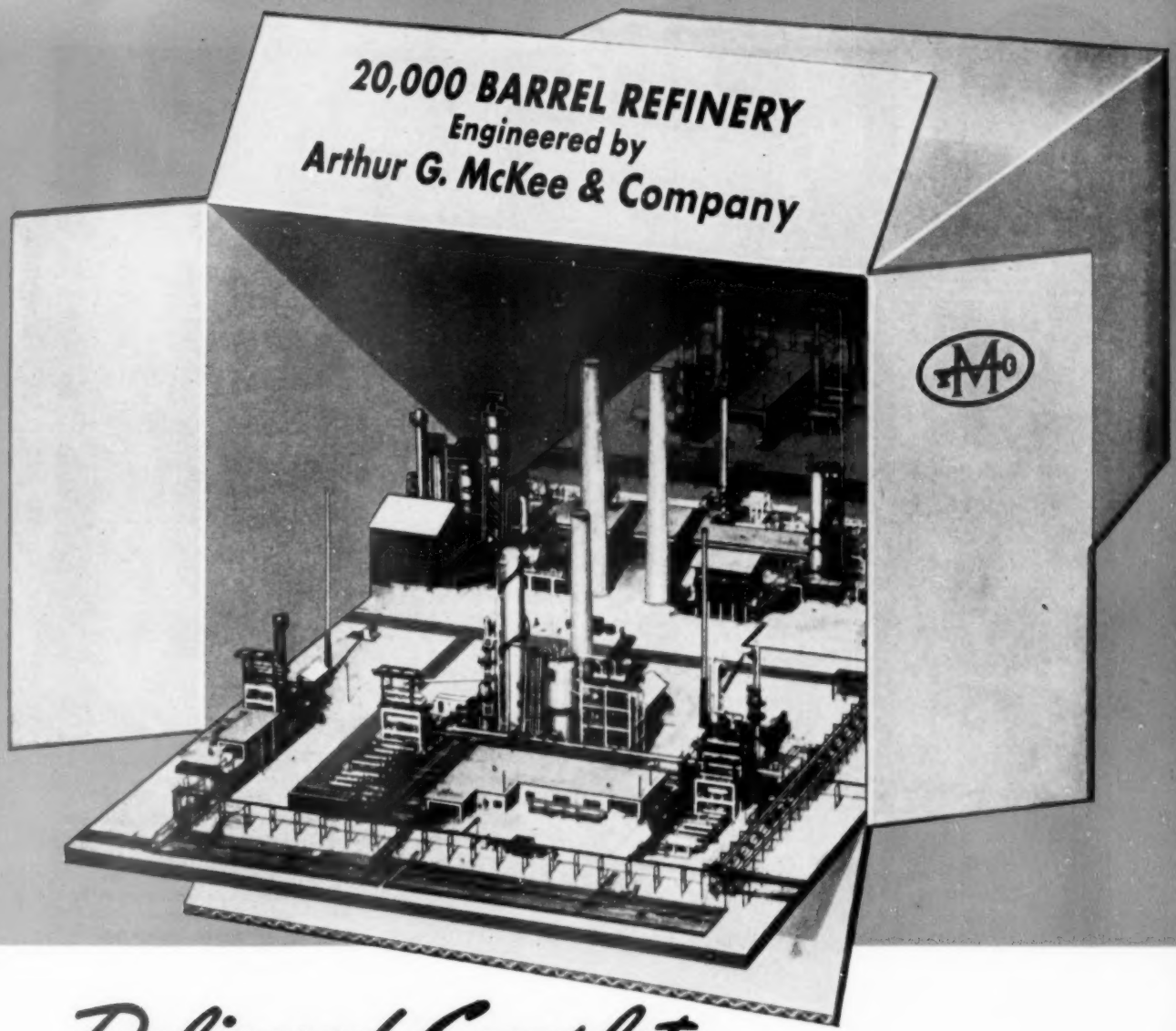

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Most of it is an old story with us (we've been doing it for many years in many countries) but we are constantly alert to new requirements of the processing industries—constantly improving plant design and construction. That's one of the reasons the McKee organization has established a world-wide reputation for sound, practical, *up-to-date* engineering of all types of petroleum and petro-chemical processing facilities.

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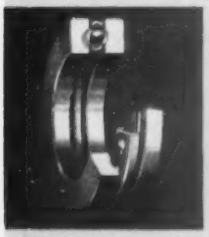
F SERIES • Light duty, one direction thrust bearing. Flat seat. Grooved races. Pressed steel retainer . . . 43 sizes ½" to 3½" I.D.

G SERIES • Medium duty ball thrust bearing. Grooved races. Pressed steel or bronze (large sizes) retainer . . . 76 sizes ½" to 7⅜" I.D.

E SERIES • Medium duty ball thrust bearing. Banded. Flat seat. Grooved races. Full complement of balls . . . 40 sizes ½" to 3½" I.D.



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1100 SERIES • Medium duty ball thrust bearing. Grooved races. Pressed steel or bronze (large sizes) retainer . . . 23 metric sizes 10 to 140 mm. I.D.

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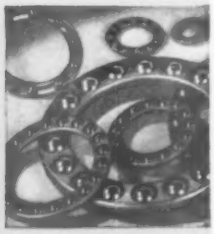

R SERIES • Ball thrust retainer. One piece, pressed steel, channel type cage . . . 79 inch sizes 0.266" to 4.232" I.D.

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Whatever mechanized equipment you make or use—whether it is large, small, rugged, fragile, heavy or light—whether it must operate at high speed, low speed, under water, in acid or under extreme temperature or dust conditions, it will do its job better, more efficiently and more economically if bearing equipped. If it is equipment that lends itself to bearing applications of the thrust type—Aetna has the answer or can come up with it pronto. 37 years of thrust bearing know-how assures this. Inquiries invited. No obligation. Aetna Ball and Roller Bearing Company, 4600 Schubert Ave., Chicago 39, Illinois.

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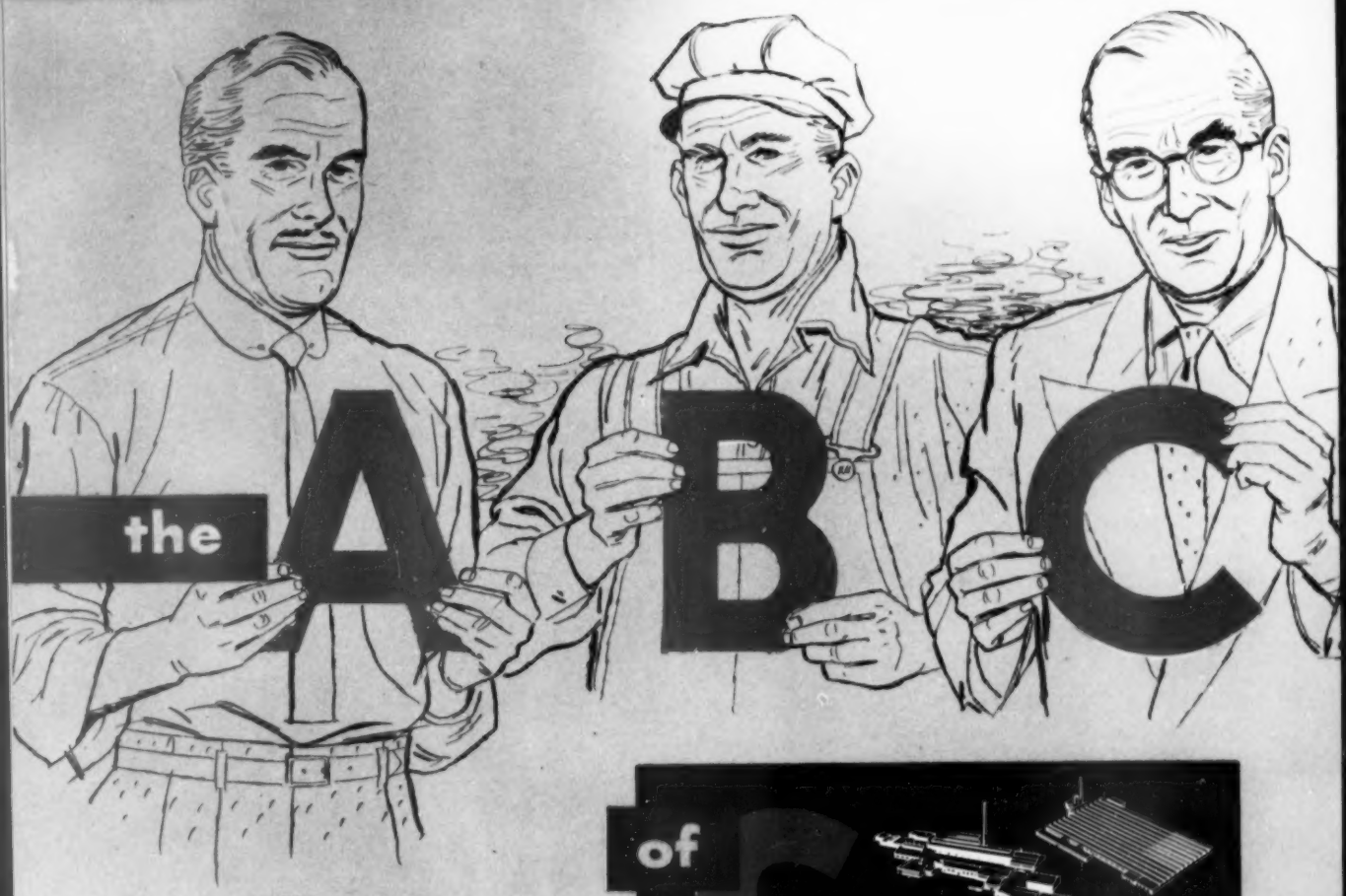

of S M D

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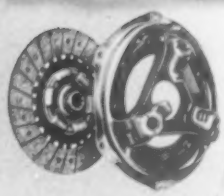

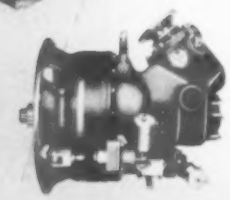

we serve the industry from A to Z

Ambition to serve . . . and zeal to produce . . . have built the famous Spicer line. We meet at the drafting board . . . we meet at the machine . . . we meet at the service conference. There is a meeting of the minds and the constructive skills on every project. Each Spicer product is a visible demonstration of that cooperation. Use Spicer engineering ingenuity and manufacturing resourcefulness to serve your needs—*better!*

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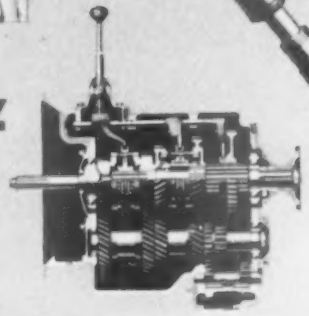

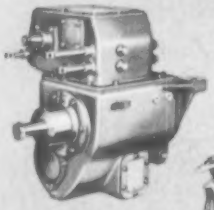

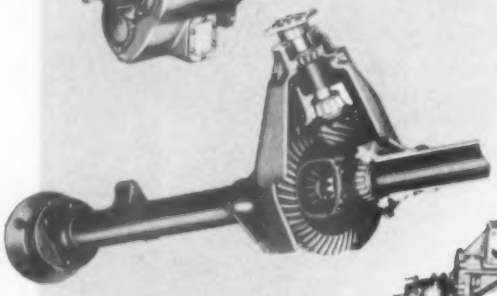

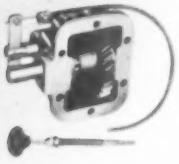

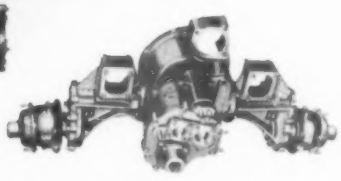

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MINNEAPOLIS MOLINE
MM
MODERN MACHINERY

5 big advantages for continuous duty and long life

EXTRA HEAVY CONSTRUCTION

STANDARDIZED QUALITY CONTROLLED PARTS

SLUDGE-FREE OPERATION

UNIFORM OPERATING TEMPERATURE

PIONEER OIL FIELD APPLICATION EXPERIENCE

Length of engine life is determined by the stamina built into the parts. By comparing the weight and size of parts you can calculate how long they will last and give trouble-free continuous service.

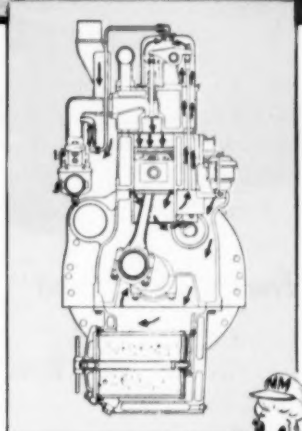
MM heavy-duty oil field engines have large diameter crankshafts, generous bearing surfaces, and heavy flywheel housing flanges that prevent deflection. Cylinder heads, removable cylinder blocks and crankcases are of thick wall design that eliminates distortion.

It is this extra margin of size and strength built into MM parts that makes them *stay put,* and makes MM engines stay on the job *longer!*

To back up this heavy-duty design under severe operating conditions, MM oil field engines have exclusive hot water jacketed base pans and metered vacuum crankcase ventilation. These features are proved by 10 years of continuous operation without major overhaul.

Get the facts about how these features prevent sludging and maintain uniform top to bottom temperature control under extremely unfavorable fuel and climatic conditions. Other MM cost-reducing features you will appreciate are the many standard parts, interchangeable on all power sizes that make possible finest precision and require minimum spare part stocks.

Quality Control **IN MM FACTORIES ASSURES DEPENDABLE PERFORMANCE ON THE JOB**



Minnie Moline's reminder: *"MM exclusive base pan and crankcase ventilation assure trouble-free operation."*

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To Complete Piping Systems For Power Plant

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Midwest Shop-Fabricated Piping saves labor, time, money and trouble in erection. Subassemblies are always practical, with the difficult operations performed in the fabricating plant. Field welding is simplified as much as possible. All pieces are accurate in alignment and dimension . . . they are thoroughly cleaned to remove all scale and dirt . . . carefully inspected and tested . . . stress relieved when necessary . . . ready to erect quickly, easily at lowest cost. It is to your advantage to use Piping Prefabricated by Midwest.

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4 Plants Are Better Than 1

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GARDNER-DENVER announces:

save 1/3 on mud pump liners!

Rebuilt Gardner-Denver reduced size liners . . . now available at a saving of about 35% . . . help you keep mud pump operations on a low-cost basis.

Two years of field experience behind the Gardner-Denver method of renewing mud pump liners are your assurance of original equipment performance.

Every rebuilt liner has a brand new inner liner of hardened and honed steel tubing pressed into a selected cast alloy liner barrel. Tests equal original specifications.

You get genuine Gardner-Denver liner quality at a substantial saving. For full details — see your supply store or your Gardner-Denver Service Specialist.

and remember —

always insist on genuine Gardner-Denver liners, rods, pistons, and valves for protected mud pump performance. Only Gardner-Denver has the authoritative knowledge to meet the specifications for which Gardner-Denver mud pumps were designed . . . only Gardner-Denver has a vital interest in helping you maintain your Gardner-Denver mud pumps at peak efficiency.

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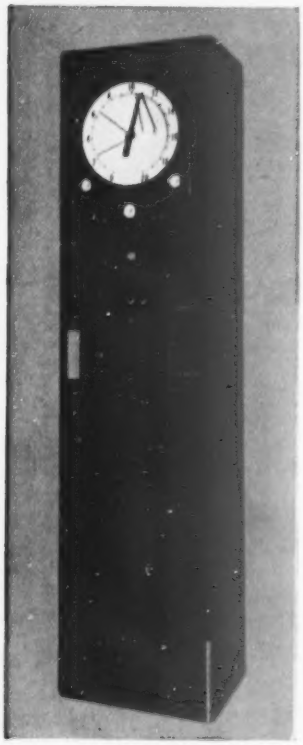
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS
FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

infra-red analysis *tells how much of a selected component exists in gas mixtures. Here, continuous analysis recorded by an* ***ElectroniK*** *potentiometer on a refinery's graphic panel is used for actual process control.*

mass spectrometry *separates materials on the basis of their different molecular weights . . . finds what constituents are present in what quantity. Above is a "package" mass spectrometer in which an* ***ElectroniK*** *instrument records test data.*



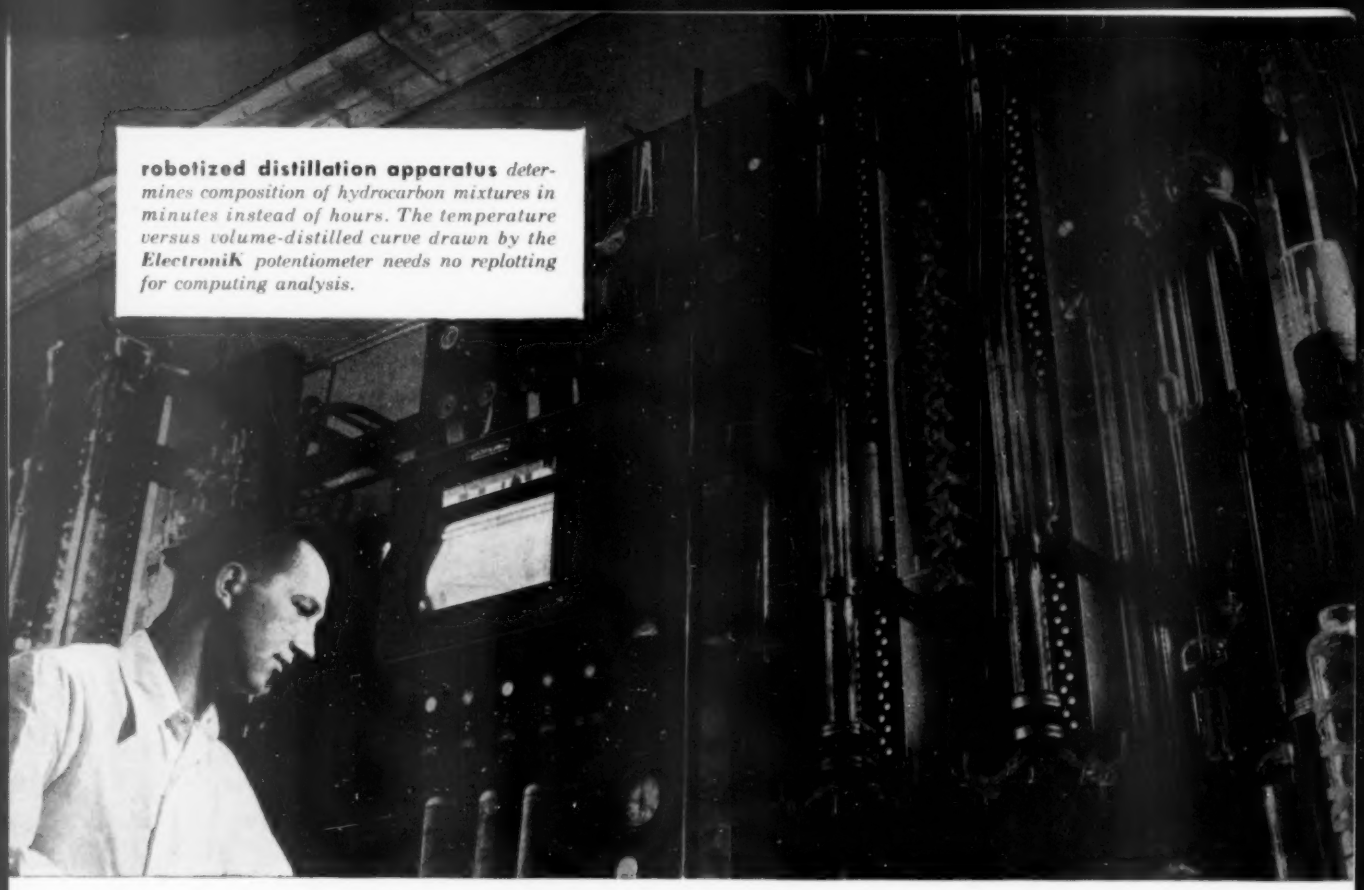
gas analyzer, *operating on the thermal conductivity principle, combines an* ***ElectroniK*** *recorder, analysis cell and accessories in a single panel assembly.*

New concepts *utilize*

These are some of the manufacturers who use *ElectroniK* instruments in their analyzers

Products of the companies checked are illustrated on these pages

Applied Research Laboratories
Baird Associates
Bausch and Lomb
Beckman Instruments, Inc.
Consolidated Engineering Corporation
√ Davis Emergency Equipment Co.
√ General Electric Co.
Jarell-Ash
Mine Safety Appliances Co.
North American Philips Co., Inc.
Perkin-Elmer Corp.
√ Podbielniak, Inc.
Precision Scientific Co.
E. H. Sargent & Co.
Tracer Laboratories
√ Applied Physics Corp.



robotized distillation apparatus *determines composition of hydrocarbon mixtures in minutes instead of hours. The temperature versus volume-distilled curve drawn by the* ***ElectroniK*** *potentiometer needs no replotting for computing analysis.*

# of process control

ElectroniK instruments

From the analytical laboratory comes a new concept of industrial process control, based directly on the desired chemical or physical characteristics of the product.

Continuous analyzers now make it possible to measure composition of gases and liquids accurately and automatically . . . to record this information . . . even to actuate automatic controls. Instead of temperature, pressure and flow, these new systems deal in terms of refractive index, density, ultraviolet and infrared spectra, radiation intensity and absorption.

An essential component of all these systems is automatic recording. To fill this critical function, leading manufacturers of automatic analyzers choose *ElectroniK* instruments. They choose them for their exceptional accuracy, that exploits fully the inherent precision of the new measuring techniques. They choose them, too, for sensitivity that records every essential change in readily readable detail. And they prefer *ElectroniK* recorders for their simple, rugged design that guarantees dependable service under any industrial conditions.

Your local Honeywell engineering representative will be glad to discuss the role of *ElectroniK* instruments in product-analysis systems . . . or in any conventional process control. Call him today . . . he is as near as your phone.

Minneapolis-Honeywell Regulator Co., *Industrial Division*, 4488 Wayne Ave., Philadelphia 44, Pa.

● **REFERENCE DATA: Write for Bulletin 15-14, "Instruments Accelerate Research."**

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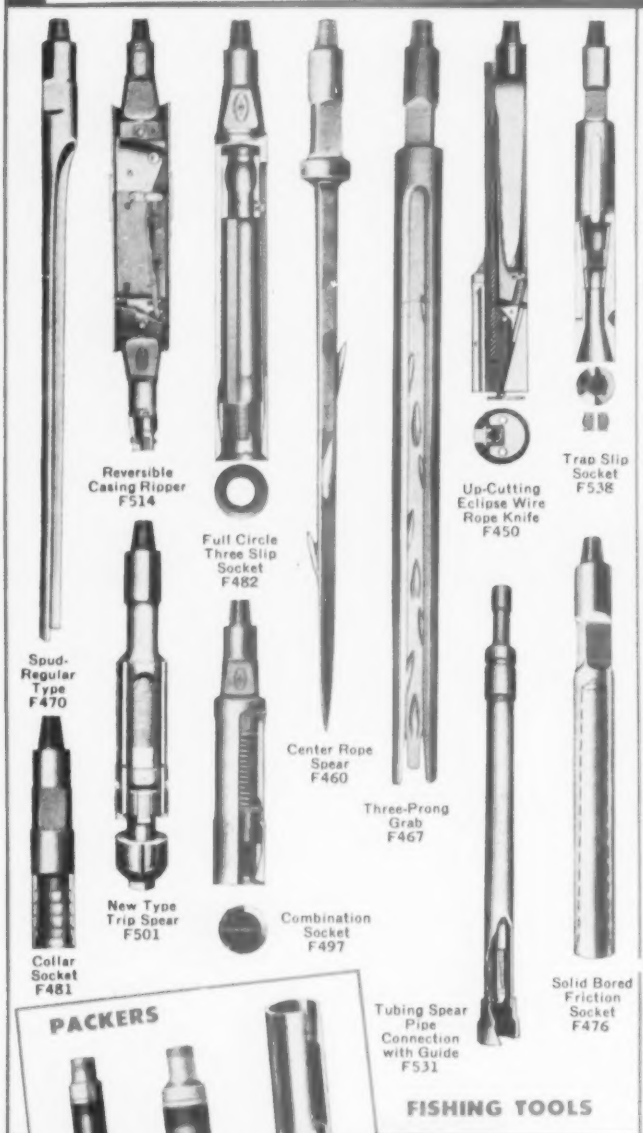
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Today we are all aware of the disastrous and far-reaching effects of a major industrial fire. Owners . . . management . . . employees . . . customers . . . almost every one suffers, in one way or another, when a serious fire strikes.

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One way to be absolutely sure of the efficiency of your plant's fire protection facilities is to call in an expert C-O-TWO Fire Protection Engineer. He is ready and willing to help you with any or all industrial fire hazard problems.

There is a personal sense of responsibility inherent with C-O-TWO Fire Protection Engineers that assures you of fully adequate firesafety . . . a definite plus in your behalf. Whether it's fire detecting or fire extinguishing . . . portables or built-in systems . . . C-O-TWO means top quality backed by experienced engineering that results in operating superiority for you at all times.

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Don't take chances with your investment. Secure the benefits of highly efficient fire protection engineering today . . . our extensive experience over the years is at your disposal without obligation. Get the facts now!

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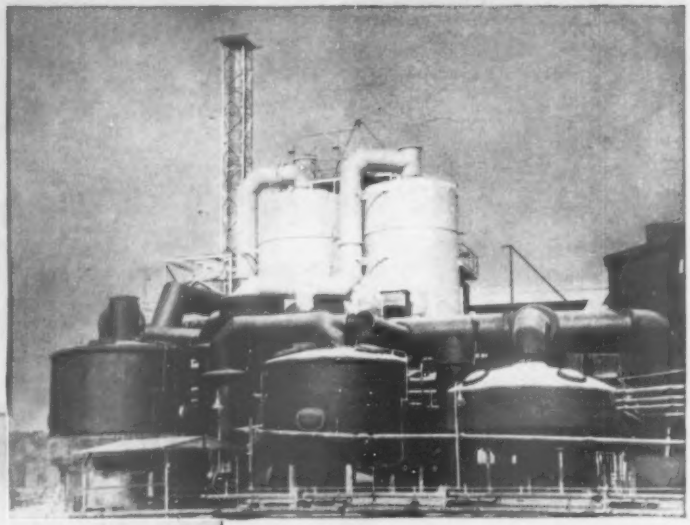
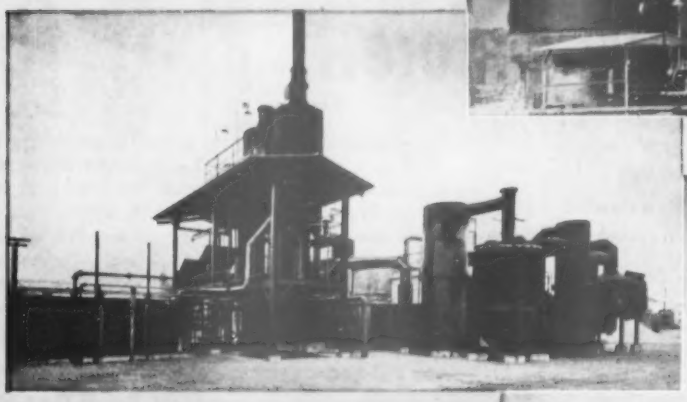
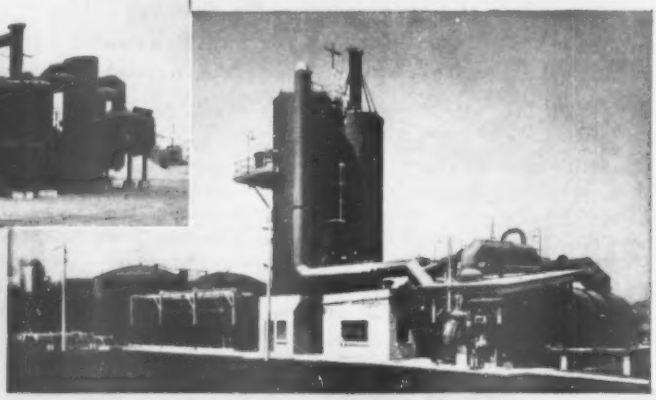


500 Tons



50 Tons



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Chemico plants are profitable investments

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PITT CHEM Modified Enamel

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Do you want to know why *Pitt Chem* Modified Enamel performs better on application and in service? Then check its *written* specifications. For *Pitt Chem* Modified Enamel is carefully formulated and manufactured to *rigid specifications* to meet exacting application and underground requirements. Low application temperatures, quick setting and handling qualities are excellent. An all-weather, all-year enamel, it may be exposed to atmospheric temperatures as low as 0°F. without cracking or disbonding. And, underground, it is unmatched for its ability to withstand soil stresses, penetration and moisture. ● Write today for new bulletin on *Pitt Chem* Modified Enamel. It tells you how to judge pipeline enamels by their specifications and gives complete data on *Pitt Chem* Modified Enamel.

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Do you have this MARVEL Inverse Oiler on your { GASOLINE / BUTANE / or / DRY GAS } engine?

then you should use this MARVEL MYSTERY OIL in the Oiler!

Here's a carefully engineered pair to improve performance of any engine . . .

The *Marvel Inverse Oiler* is designed to feed *Marvel Mystery Oil* in exact proportion to engine speed and load. Prevents excess wear on valve stems and guides . . . keeps upper piston rings free to move in their grooves . . . retards ring flutter . . . and cushions ring pounding which can result in ring breakage. In addition, *Marvel Mystery Oil* reduces cylinder wall wear, and gives assurance against valves sticking. Remember, it is *the oil* which must do these things and only *Marvel Mystery Oil* is blended for this purpose and for this oiler. Over 30 years of exceptional performance.

This Chart shows the proper setting for constant load engines

BRAKE H. P. AT BELT	NAT. GAS CU. FT. PER HOUR	BUTANE GALLONS PER HOUR	GASOLINE GALLONS PER HOUR	M. M. OIL DROPS PER MIN.	M. M. OIL HOURS PER QUART
10	115.	1.07	1.12	4	228
15	172.5	1.60	1.68	6	152
20	230.	2.14	2.24	8	114
25	287.5	2.67	2.80	10	91
30	345.	3.21	3.36	12	76
35	402.5	3.74	3.92	14	65
40	460.	4.28	4.48	16	57
45	517.5	4.81	5.04	18	50
50	575.	5.35	5.60	20	45
60	690.	6.42	6.72	24	38
70	805.	7.49	7.84	28	32
80	920.	8.56	8.96	32	28
90	1035.	9.63	10.08	36	25
100	1150.	10.70	11.20	40	22
120	1380.	12.84	13.44	48	19
140	1610.	14.98	15.68	56	17
160	1840.	17.12	17.92	64	14
180	2070.	19.26	20.16	72	12
200	2300.	21.40	22.40	80	11
225	2587.5	24.00	25.20	90	10
250	2875.	26.75	26.00	100	9
275	3162.5	29.42	31.10	110	8
300	3450.	32.10	33.60	120	7

EXAMPLE:—If you use 805 cu. ft. of dry gas, 7.49 gallons of butane or 7.84 gallons of gasoline, your H.P. is about 70, so adjust oiler to feed 28 drops per minute. You will then receive about 32 hours per quart of MARVEL MYSTERY OIL.

If engine load increases after setting for normal load, oiler will automatically increase its feed, or decrease its feed when load is lessened.

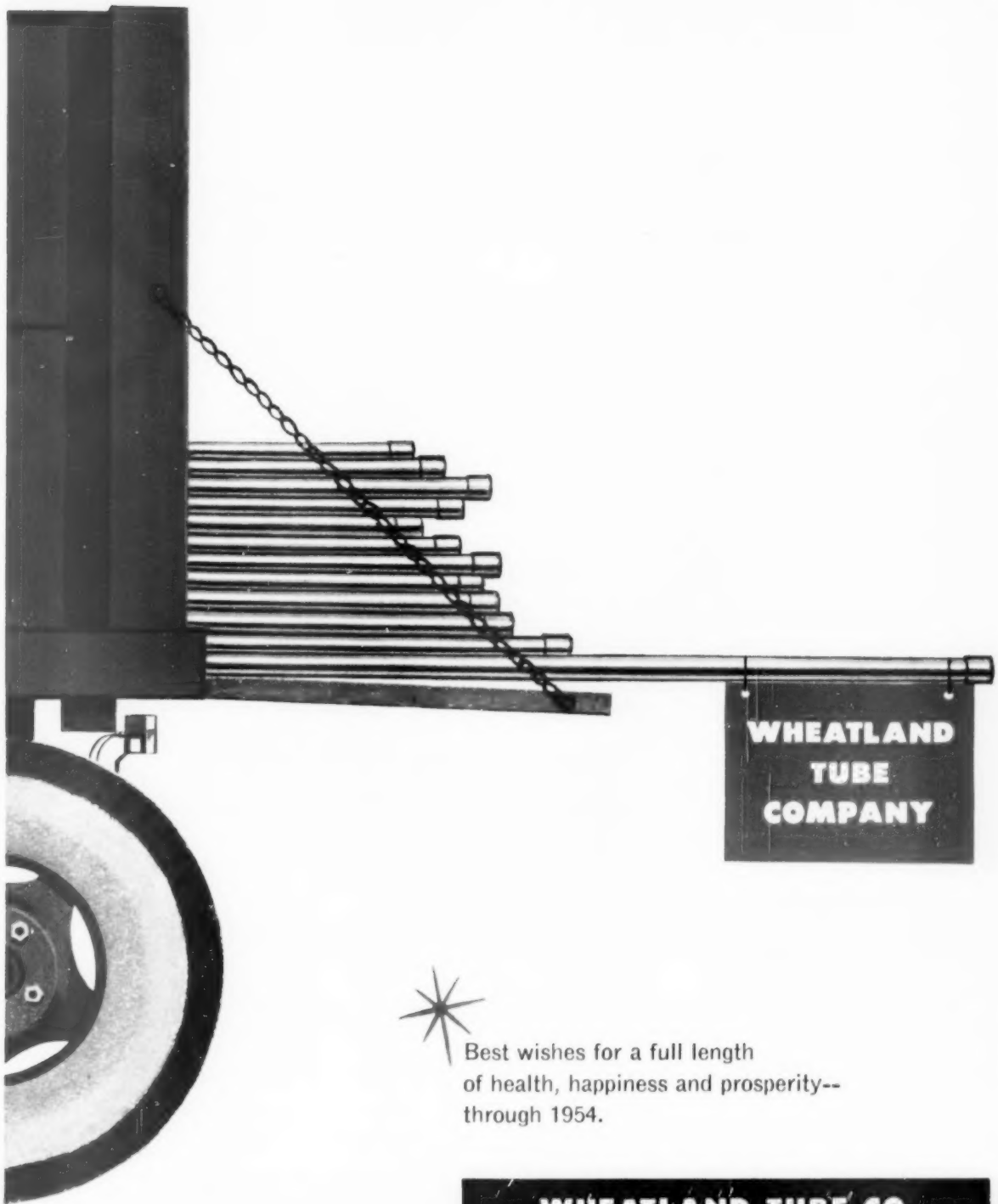
When more than one oiler is used

To determine drop count per oiler when more than one oiler is used on an engine—divide recommended drop count by number of oilers.

NOTE: Guarantee on oiler is void if any other oil than MARVEL MYSTERY OIL is used therein. Some *engines* also carry this guarantee policy.

See Your Local Jobber or Oil Well Supply House

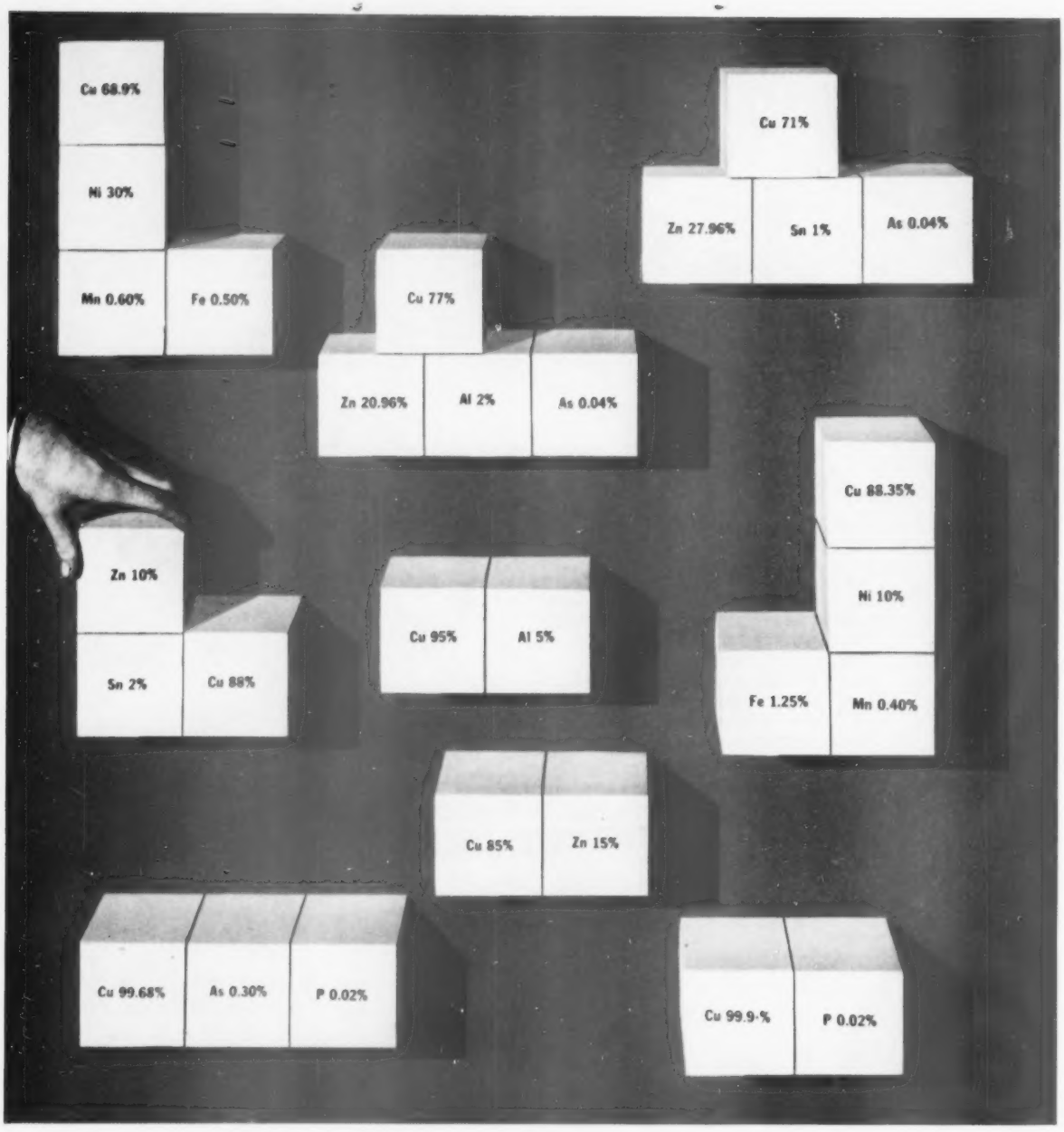
EMEROL MFG. CO. Dept. 373, 242 West 69th Street, New York 23, N. Y.



Best wishes for a full length
of health, happiness and prosperity--
through 1954.

WHEATLAND TUBE CO.

BANKERS SECURITIES BUILDING, PHILADELPHIA 7, PA.



Which combination is best for your tube problem?

On the decision you make depends the rate of return on your investment. And it's apt to be a big investment.

Each of these condenser and heat exchanger tube alloys has been scientifically developed to have specific metallurgical properties to meet specific operating conditions.

To supplement extensive metallurgical research and programs of laboratory and field tests, our Technical Department maintains files that record over many years the life histories of tubes in a wide range of copper alloys under many kinds of actual service. Combined with the information of metallurgical science, these records of actual performance provide the soundest possible basis for selecting the tube alloy that will best meet the conditions under which your equipment must operate.

This experience is freely available to you. Draw upon it in connection with your heat exchanger and condenser tube problems. Simply write to our Technical Department. Meanwhile, send for your free copy of Publication B-2, "Anaconda Tubes and Plates for Condensers and Heat Exchangers." *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.*

5819

ANACONDA

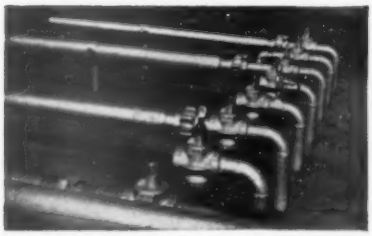
Heat Exchanger Tubes

Ambraloy-927*; Arsenical Admiralty-439; Cupro Nickel, 30%-702; and other copper alloys

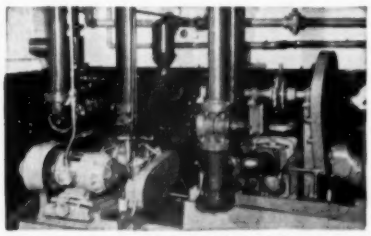
*U.S. Patent No. 2,060,685 (ORIG.)

Straight through, clean as a whistle! That's the kind of *flow perfection* you get with an A.C.F. Round Port Valve. Because they're the exact same size and shape as the pipe itself, there are no obstructions. You *always* get full capacity flow of heavy viscous ladings... without loss in head pressure. There are no abrasive effects from solids in suspension.

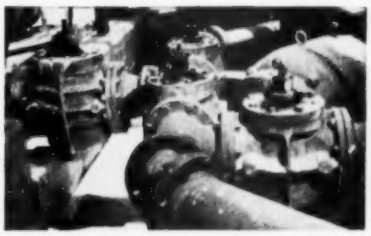
The full pipe area and non-wedging effects of Round Port Valves are also found in A.C.F. Rectangular Port Valves. Both are designed to give you long, trouble-free service with minimum maintenance. Don't settle for less than the very best. It pays!



The Petroleum Industry finds full-pipe area of A.C.F. Valves of great advantage on both natural gas and crude oil.



In Sewage Treatment Plants the A.C.F. exclusive Cylindrical Plug shears obstructions, provides uninterrupted flow.

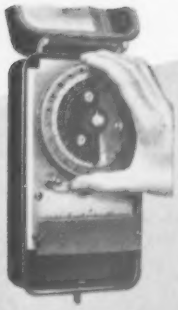


In Processing A.C.F. Round Port Valves are 100% obstruction free, ideal for handling materials in suspension.

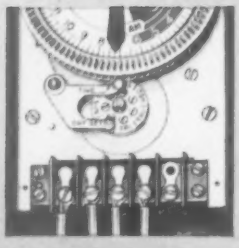
a.c.f. CYLINDRICAL FULL PIPE AREA PLUG VALVES

Write for Catalog 4-OG, American Car and Foundry Company, Valve Division, 1501 E. Ferry Ave., Detroit 11, Michigan

Representatives in 50 Principal Cities



Cutler-Hammer Program Time Switch gives automatically scheduled pumping, set up easily by means of pull tabs—one for each 15 minute interval.



Day-omission feature—for non-operation any selected days of week.

Cutler-Hammer 9589 Oil Well Pumping Controller with 3 coil overload protection and time delay relay.

ONE TRIAL WILL TELL YOU
It's Genuine
Oil Country
Control

You'll only have to make a comparison *once* to see why Cutler-Hammer Oil Well Pumping Control is called *the* Oil Country Control and to see why oil men are installing it in preference to any others.

It is the outcome of a genuine, thorough and sincere contact with oil country conditions; with oil men's wishes. Not just to start, stop and protect motors and equipment successfully and dependably . . . but to meet and beat the oil country enemies of good performance . . . heat, humidity, static, dirt, dust, bugs, prevalent single phasing, sometimes careless handling.

Take a look at C-H. Note the ventilating openings that create a chimney draft to keep the "works" cool. Note the aluminum coating that bounces back the sun's rays. Note the out-in-the-open contacts that stay cooler and being "vertical," shed dust.

Note how all openings are screened, baffled, louvred to keep out dirt and dust, and bugs. See how Neoprene gasketing keeps dust out of the timer how the excess torque clock motor keeps "ticking" away even if dust gets in.

Take a look at the scheduling mechanisms, the easy on-off scheduling in 15 minute increments, the automatic day-omission feature. And there's manual or automatic restarting after an outage, either all at once or staggered starting.

Here's a popular feature too . . . optional 3 coil overload protection where single phasing is a problem; standard 2 coil where it is not a problem.

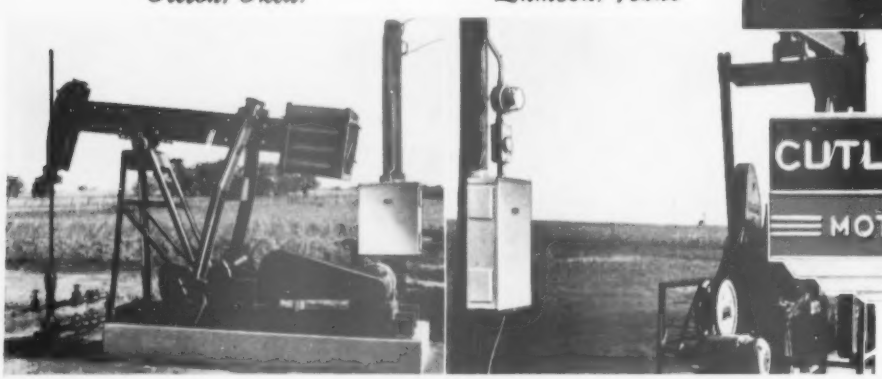
Note you don't have to rebuild or clean up the starter after a lightning arrester blows.

These are but some of the features that make this starter stand out like a derrick on a flat plain. Once you try it, you'll keep on using it.

CUTLER-HAMMER, Inc., 1453 St. Paul Ave., Milwaukee 1, Wis. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto, Ontario.

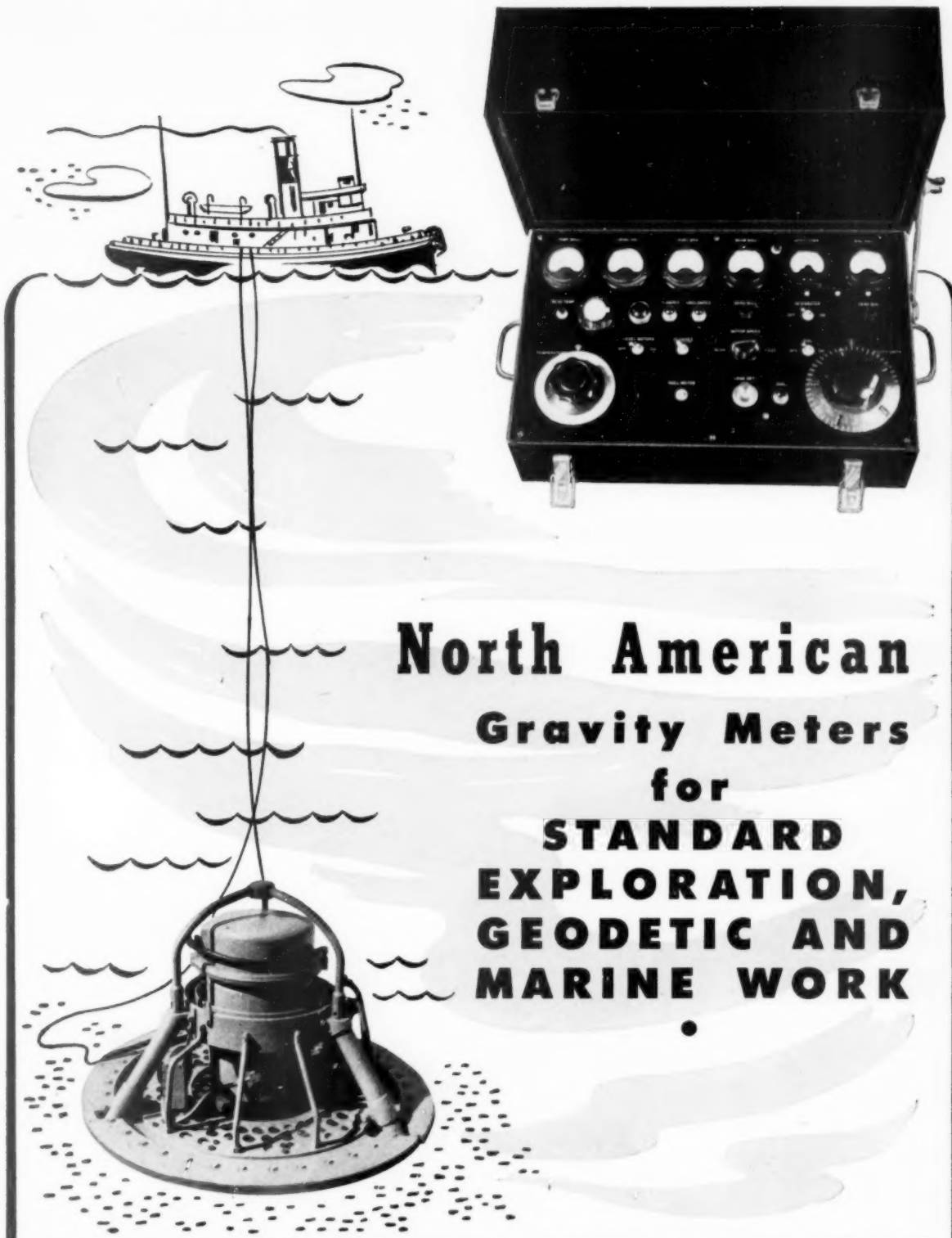
Snyder, Texas

Oilton, Okla. *Lamesa, Texas*



CUTLER-HAMMER
MOTOR CONTROL
C-H

MEMBER AMERICAN PETROLEUM INSTITUTE



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Manufacturers of Geophysical Equipment and Precision Apparatus

NORTH AMERICAN GEOPHYSICAL COMPANY

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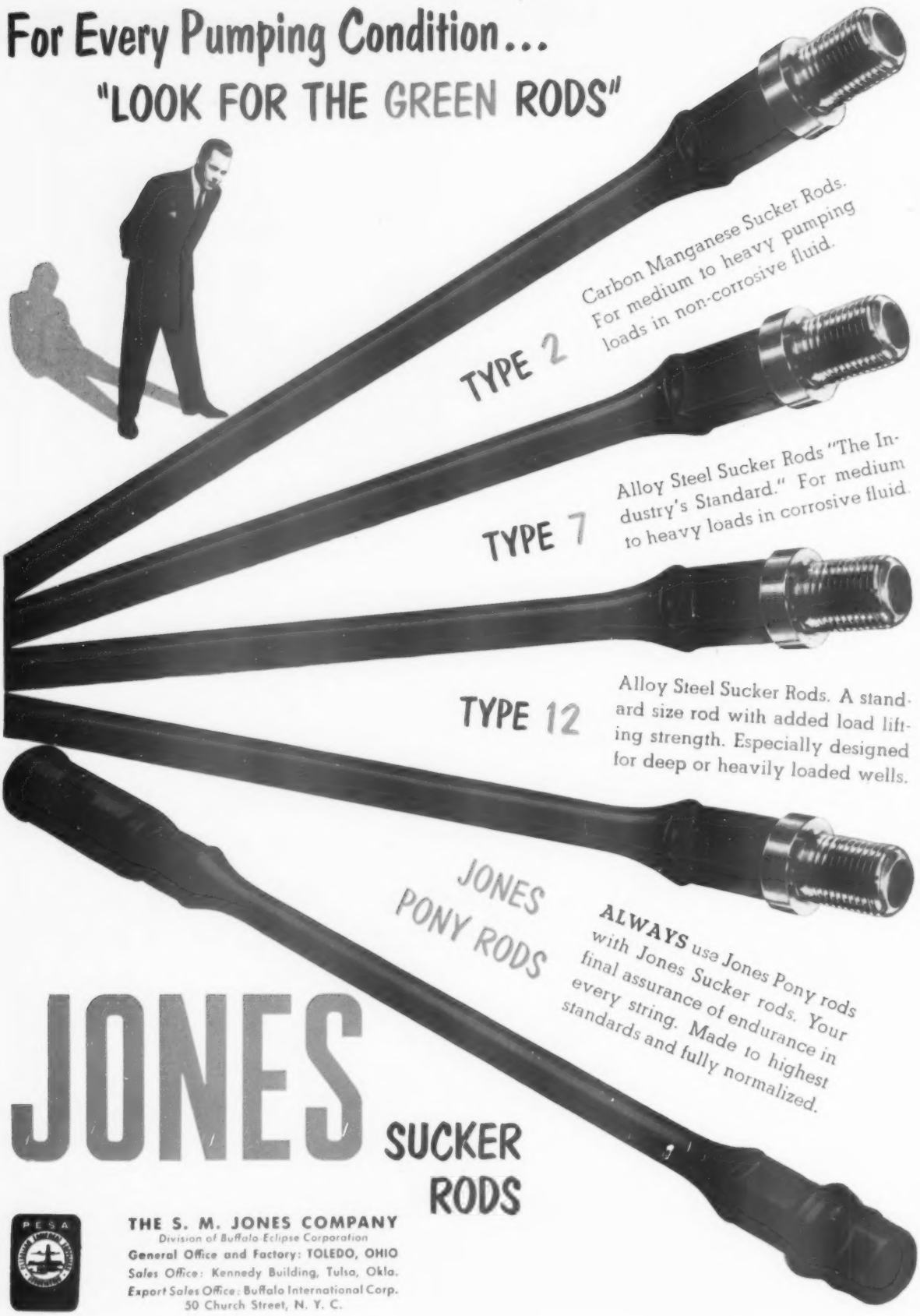
For Every Pumping Condition...

"LOOK FOR THE GREEN RODS"



TYPE 2 Carbon Manganese Sucker Rods. For medium to heavy pumping loads in non-corrosive fluid.

TYPE 7 Alloy Steel Sucker Rods "The Industry's Standard." For medium to heavy loads in corrosive fluid.

TYPE 12 Alloy Steel Sucker Rods. A standard size rod with added load lifting strength. Especially designed for deep or heavily loaded wells.

JONES PONY RODS

ALWAYS use Jones Pony rods with Jones Sucker rods. Your final assurance of endurance in every string. Made to highest standards and fully normalized.

JONES SUCKER RODS

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REFINERY PROCESS NEWS

PUBLISHED BY REFINERY PROCESS DIVISION, THE M. W. KELLOGG COMPANY DECEMBER 1953

Chile's First Refinery Now Well Underway

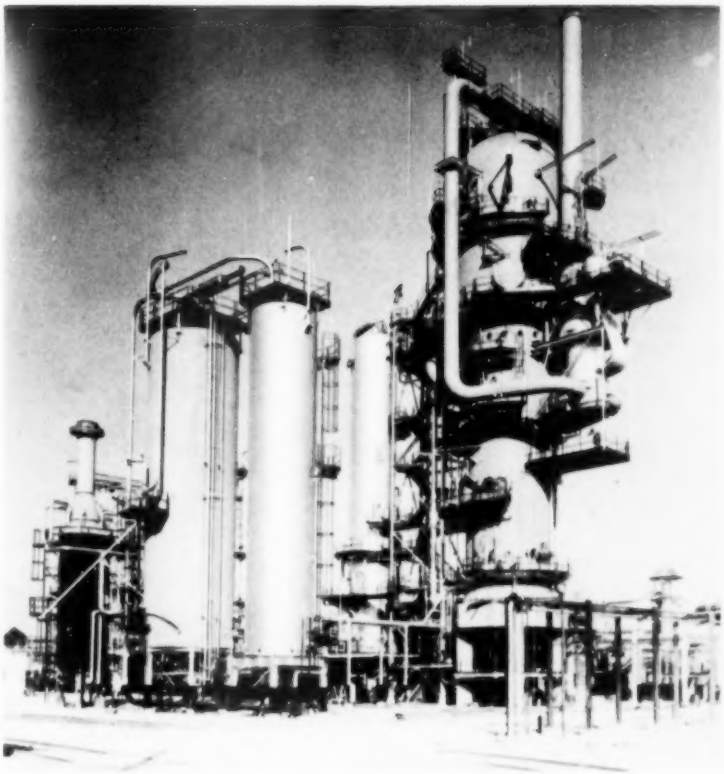
Construction is now well underway on Chile's first petroleum refinery. It was designed by Kellogg and is now being erected under supervision of Kellogg Pan-American Corporation. The new plant will be located ten miles north of Valparaiso and is expected to be on stream by mid-1954.

This $10,000,000 refinery, being built for Expresa Nacional del Petroleo, will have a crude charge capacity of 20,000 BPD and will employ the most modern type of combination thermal equipment to process either indigenous or imported petroleum.

Processing steps include topping, visbreaking, gas oil cracking, thermal reforming, gasoline stabilization and treating. In addition to motor gasoline, the refinery will produce LPG, tractor distillate, kerosene, two grades of diesel oil and heavy fuel oil.

This is only one of several major projects currently underway in South America by Kellogg. Others include a complete refinery in Argentina; two refineries (of 5,000 BPD and 10,000 BPD capacities) and nitrogen fertilizer facilities at three different locations in Brazil.

Shown in the foreground is the stabilizer tower of the new refinery while in the background is the framework of the furnace for the naphtha reformer.



First Model "B" Orthoflow Cracker Goes on Stream Smoothly at Toledo

The first of Kellogg's new Model "B" Orthoflow Fluid catalytic cracking units has now been put on stream at Pure Oil's Toledo refinery. Reports from the first three weeks of operation indicate that the new design is completely successful. Catalyst loss is at a minimum, coke-to-conversion ratio is low, and flexibility excellent.

This new model is one of two versions of Kellogg's exclusive Orthoflow design both of which involve the single vessel construction with straight-line flow of catalyst. The Model "B" Orthoflow, as differentiated from the Model "A," has the regenerator placed above the reactor. As a result, the regenerator is operated at a lower pressure than in the Model "A", which brings about savings in direct operating costs due to reduced horsepower requirements for compression of regenerative air.

For example, in the Model "A", pressure of about 18 pounds is required in the regenerator with a simultaneous pressure of ten pounds in the reactor in order to maintain the optimum circulation of catalyst from one zone to the other. In the newer "B" design, the reactor pressure is held at about 15 pounds while the regenerator is operated at a pressure in the order of seven pounds—retaining the same eight pound differential while simultaneously transferring the major compressor requirements to the lower pressure side of the operation.

In addition to obtaining a significant decrease in the compressor horsepower required to supply combustion air to the regenerator, this arrangement has another advantage. The higher reactor pressure permits a slight decrease in the size of this vessel as well as in that of the fractionator.

(Continued on reverse side)

REFINERY PROCESS NEWS

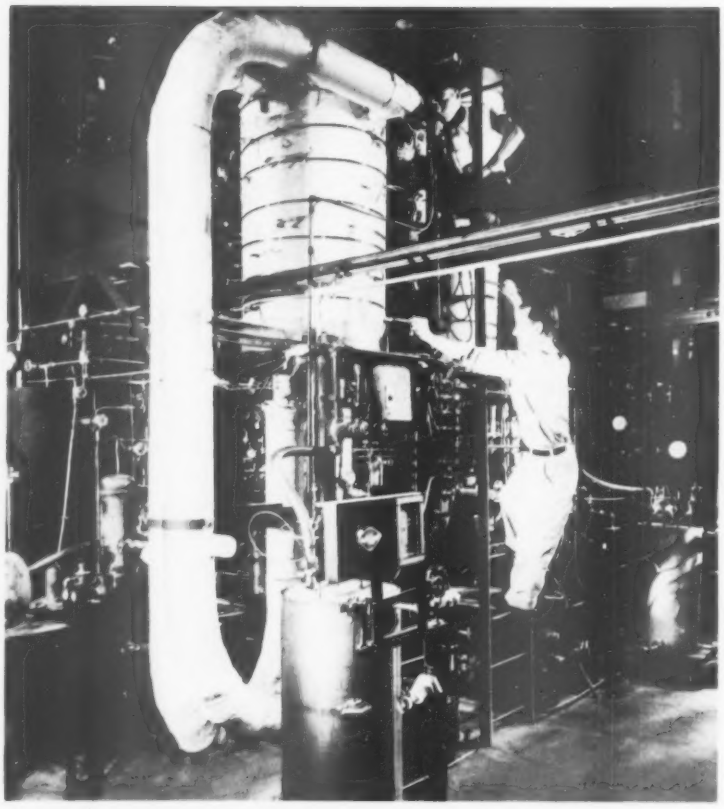
CONTINUED FROM PRECEDING PAGE

Model "B"...continued

While on the surface it would appear that the Model "B" should always be preferred over the Model "A" this is not necessarily the case. The final selection is inevitably dependent upon the individual refiner's processing requirements.

Regardless of which type a refiner installs, commercial operating experience with the five Orthoflow units already built by Kellogg clearly establishes the superiority of this new design. For example, just recently a Model "A" design was placed on stream abroad. The ease with which the unit can be started up and operated is indicated by the fact that Kellogg's operators were released only six weeks after placing the plant on stream. At that time the unit had completed a thoroughly satisfactory demonstration run and had been accepted by the refiner. Considering that the Kellogg operators faced a language barrier in training the refiner's operators in addition to dealing with equipment of foreign manufacture, there's slight question but that this short start-up and indoctrination period constitutes an excellent performance record.

Meanwhile, six other Orthoflows are underway. With capacities varying from less than 2000 to more than 28,000 BPD in fresh feed, they are going up on sites in as widely separated sections of the world as Australia, Texas, Pennsylvania, Yugoslavia and Canada.



New Pilot Plant for Data on Platinum Catalyst Life

Shown here is a new four-barrel-per-day pilot plant Kellogg has just completed in its extensive pilot plant laboratories in Jersey City. It is currently being used to pinpoint the ultimate life of the regenerative-type Sinclair-Baker RD-150 platinum catalyst.

Two commercial units employing the RD-150 catalyst are now underway, one on the East Coast and one in the Midwest.

Foundation Work Marks Site of New Fluid Hydroformer

Foundations are well along on this large Fluid Hydroformer—one of two currently being erected for Cities Service. This one at Lake Charles is scheduled for completion in 1954. The other is being built at East Chicago.

Still a third Fluid unit is now being engineered for another refiner located in the Mid-West.

For further information, technical data, etc., on any refining process, write

REFINERY PROCESS DIVISION

THE M. W. KELLOGG COMPANY

225 Broadway, New York 7, N. Y.

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KELLOGG — A DIVISION OF PULLMAN

Fully Crowned Tooth Design Can Be Used To Solve Your Long-Standing Coupling Problem

A major improvement in gearing for power transmission—a fundamental improvement in gear tooth design that practically eliminates all "end tooth and tip" contact and provides greater freedom of axial movement distinguishes Amerigear Couplings from common gear-type couplings. Amerigear Couplings offer many more advantages than are obtainable with the common basic designs. The Amerigear Crowned Tooth Design can be applied wherever couplings are required. There are many instances where this design has been utilized to simplify power transmission mechanisms and add reliability to their performance in a measure heretofore found impossible.

If your problem arises from excessive offset or angular misalignment, tight back lash requirement, space limitations, high speeds and loads, or any combination of these, the solution is best made by the utilization of the Amerigear Fully Crowned Tooth. Amerigear engineers are available for consultation.

AMERICAN FLEXIBLE COUPLING COMPANY
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Amerigear
Fully Crowned Tooth Design Solves Wide Range of Power Transmission Problems.
Crowned Tip Contacts Root of Internal Gear Tooth in Sleeve, Accurately Piloting Sleeve With a Ball and Socket Action.
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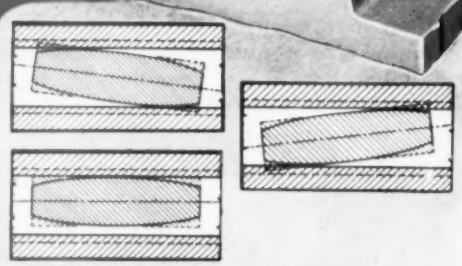
THE ONLY GEAR TYPE COUPLING WITH FULLY CROWNED TEETH
Oil Seals of Amerigear Couplings Are As Advanced In Design, Performance, And Effectiveness As Is The Amerigear Fully Crowned Tooth.
Pat. & Pat. Pending
Crowned Flank Carries All the Load and Provides for Correction of Lateral and Angular Misalignments When Required.



Comparison Of Amerigear Fully Crowned Tooth Design With Gearing Of Conventional Gear-Type Couplings Shows How "End Tooth And Tip" Contact Is Practically Eliminated And Why Greater Freedom Of Axial Movement Is Provided By Amerigear Fully Crowned Tooth Design (dotted lines indicate gear teeth of conventional gear-type coupling).

Copyright 1953

AMERICAN FLEXIBLE COUPLING COMPANY
ERIE, PA., U. S. A.

Please send me further information regarding AMERIGEAR COUPLINGS with the fully Crowned Teeth and Catalog No. 501.

Name_____ Title_____

Company_____

Address_____

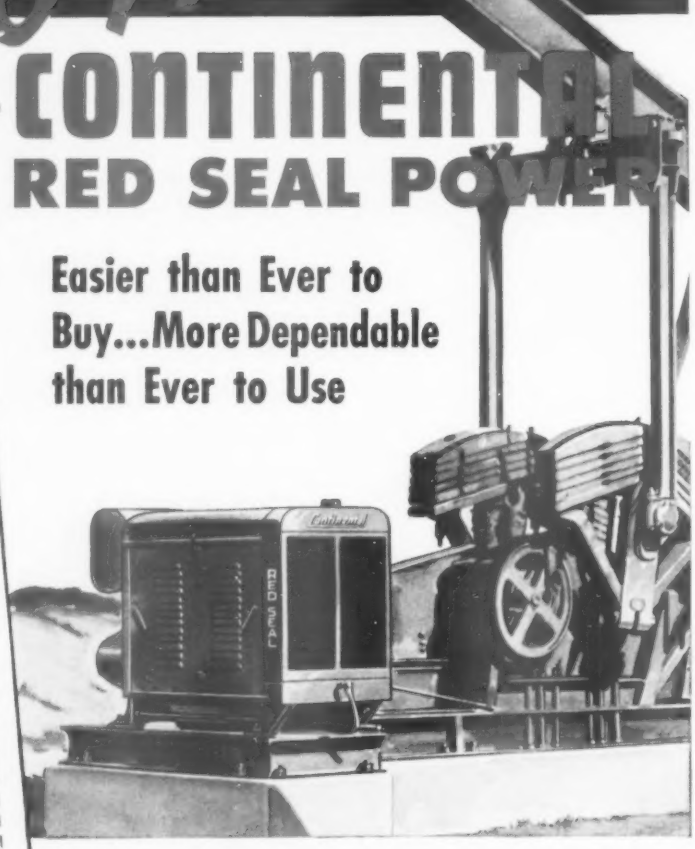
City_____ Zone_____ State_____

Please attach to your business letterhead

Ask for it at your Supply Store

...CONTINENTAL RED SEAL POWER

Easier than Ever to Buy...More Dependable than Ever to Use



INDUSTRIAL GASOLINE ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N56	4	2⅛	3½	56	14.2 @ 2200 RPM
N62	4	2⅛	3½	62	15 @ 2200 RPM
Y69	4	2½	3½	69	21.4 @ 2400 RPM
Y91	4	2⅞	3½	91	28.5 @ 2400 RPM
Y112	4	3 1/16	3½	112	32 @ 2400 RPM
F124	4	3	4⅛	124	36 @ 2400 RPM
F140	4	3 1/16	4⅜	140	42 @ 2400 RPM
F162	4	3 1/16	4⅛	162	49 @ 2400 RPM
F186	6	3	4⅛	186	60.5 @ 2400 RPM
F209	6	3 1/16	4⅛	209	68 @ 2400 RPM
F226	6	3 5/16	4½	226	73 @ 2400 RPM
F244	6	3 7/16	4⅛	244	79 @ 2400 RPM
M271	6	3⅝	4⅛	271	86.2 @ 2400 RPM
M290	6	3¾	4⅛	290	92.2 @ 2400 RPM
M330	6	4	4⅛	330	104.4 @ 2400 RPM
B371	6	4⅛	4⅛	371	110 @ 2400 RPM
B427	6	4 5/16	4⅛	427	127 @ 2400 RPM
J382	4	4½	6	382	78.3 @ 1500 RPM
G134	4	3⅛	4⅛	134	32.2 @ 2000 RPM
G157	4	3⅜	4⅛	157	37.7 @ 2000 RPM
H227	4	3⅜	5½	227	54 @ 2000 RPM
H243	4	3¾	5½	243	58.2 @ 2000 RPM
*H260	4	3⅞	5½	260	62 @ 2000 RPM
T371	6	4⅛	4⅛	371	119 @ 2400 RPM
T427	6	4 5/16	4⅛	427	140 @ 2400 RPM
U501	6	4½	5¼	501	160 @ 2400 RPM
R513	6	4½	5⅛	513	164.3 @ 2400 RPM
R572	6	4¾	5⅛	572	182.4 @ 2400 RPM
R602	6	4⅜	5⅛	602	191.7 @ 2400 RPM
S749	6	5⅛	5½	749	217 @ 2200 RPM

INDUSTRIAL DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
GD157	4	3⅜	4⅛	157	39 @ 2000 RPM
HD243	4	3¾	5½	243	54.7 @ 2000 RPM
*HD260	4	3⅞	5½	260	59.3 @ 2000 RPM
TD427	6	4 5/16	4⅛	427	106.5 @ 2000 RPM
RD572	6	4¼	5⅛	572	142.5 @ 2000 RPM
SD802	6	5 5/16	5½	802	184.3 @ 1800 RPM

*Available for Industrial applications only.

Now add *accessibility* to the many other good reasons for standardizing on Red Seals for oil field jobs within their power range. That range is a broad one, too: look at the list at left. It includes models for use on all standard fuels—each the product of more than 50 years' engine-building experience—each backed by parts and service facilities coast to coast.

CONTINENTAL MOTORS · Powerful as the Nation · AMERICA'S STANDARD

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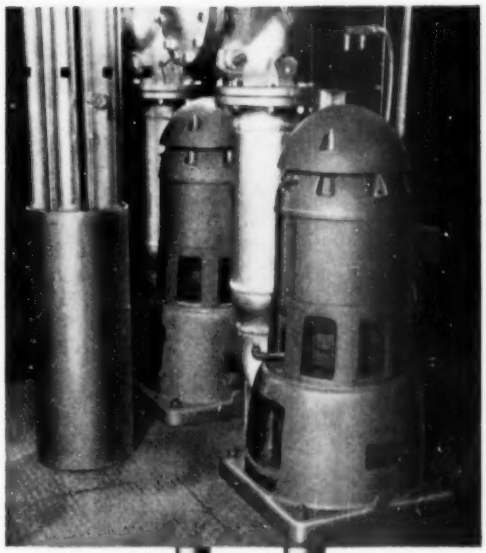
Continental Motors Corporation

MUSKEGON, MICHIGAN

There's more to this installation than meets the eye . . . .

. . . that's one reason why plant engineers specify

Ingersoll-Rand Vertical Turbine-type Pumps



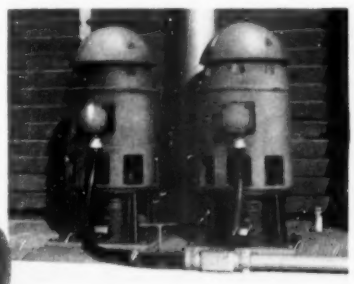
When your liquid moving application requires a "lot of pump" in a little space, I-R vertical turbine pumps are the answer. These pumps are available in capacities to 15,000 gpm with a variety of open and closed impellers to give you the head you need in one or more stages. And look at these advantages:

- SMALL FLOOR SPACE
  . . . the largest pump takes only 17 square feet!
- MINIMUM FOUNDATION REQUIREMENTS
- OPTIONAL DISCHARGE LOCATION
  . . . above or below floor level.
- COLUMN LENGTH TO SUIT YOUR APPLICATION
- OPEN SHAFT OR INNER COLUMN CONSTRUCTIONS
  . . . oil or water lubrication.

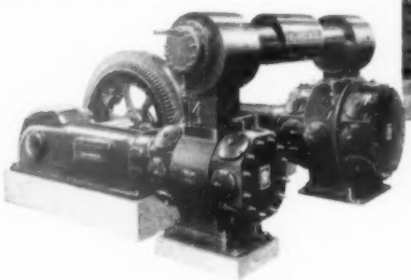
For your next circulating, dewatering or bulk transfer application, consult one of our branch offices for information on Ingersoll-Rand vertical turbine pumps. In the meantime, we'll be glad to send you Catalog 7228 on request.

The two 12 APH single-stage pumps shown above transfer water from an indoor reservoir to the cooling tower where three-stage pumps of the same type and size, with underground discharge, recirculate the cooled water through the plant system.

At a large mid-western automotive plant, these pumps serve the cooling system for Ingersoll-Rand compressors totaling 2800 horsepower.



A typical PRE compressor at this plant.



Ingersoll-Rand 937-10

Cameron Pump Division
11 Broadway, New York 4, N. Y.

PUMPS • COMPRESSORS • CONDENSERS • VACUUM EQUIPMENT • GAS & DIESEL ENGINES • ROCK DRILLS • AIR & ELECTRIC TOOLS

In catalytic reforming

It's the **CATALYST**

That's why you should know the story behind the catalyst used in

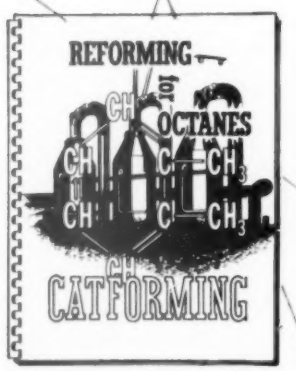
CATFORMING

THAT COUNTS

Many years have gone by since catalytic reforming was first utilized by the petroleum industry. As with many developments, earlier methods fell far short of ideal.

Many years ago Atlantic's engineers and chemists looked well ahead to the more demanding needs of industry-wide commercial application. They devoted themselves to continuous and unrelenting laboratory research. One catalyst after another was rejected for failing to meet Atlantic's projected ideal catalyst. Finally, a catalyst possessing new characteristics and demonstrating an ability to surmount the shortcomings of previously developed catalysts was found. This completely new catalyst, combining the advantages of improved selectivity, greater stability, excellent resistance to poisoning, and easier regeneration, is the heart of CATFORMING.

CATFORMING is now in successful commercial operation, furnishing positive proof that IT'S THE CATALYST THAT COUNTS. You are invited to share the many benefits of CATFORMING by joining our ever-growing list of licensees. Call or write for our new detailed bulletin for your introduction to CATFORMING. The Atlantic Refining Company, Research and Development Department, P. O. Box 8138, Philadelphia 1, Pa. (Telephone, Howard 5-2345.)



This detailed bulletin yours for the asking!

ATLANTIC

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request

- No internal wearing parts.
- No valves, pistons, or vanes.
- No internal lubrication.
- Low maintenance cost.
- Saves floor space.
- Desired delivery temperature automatically maintained.
- Slugs of liquid entering pump will do no harm.
- 75 pounds in a single stage.

NASH ENGINEERING COMPANY
313 WILSON, SO. NORWALK, CONN.

BEST in the Long Run!

AMERICAN BOSCH MAGNETOS

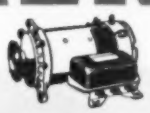
Time is money where oil industry equipment is concerned. American Bosch Super Powered Magnetos save on-the-job time for you. From starting time measured in seconds to trouble-free ignition measured in years, these rugged, power-packed Magnetos provide the constant, faultless spark that means maximum efficiency at all operating speeds and loads.

American Bosch Magnetos are precisely engineered for long, economical life on many types of producing, pipeline and refinery equipment—from the biggest, heavy duty engine right down to the most modern, high-speed power unit. That's why they are preferred as original equipment by many leading engine manufacturers.

With American Bosch you save to start with because of a liberal Trade-In Allowance on the old magneto you replace . . . you save in the long run because of dependable performance. Write today for all the facts and the name of your nearest Sales and Service Agency. American Bosch Corporation, Springfield 7, Massachusetts.

AMERICAN BOSCH

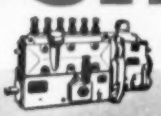
Automotive and Aviation Magnetos

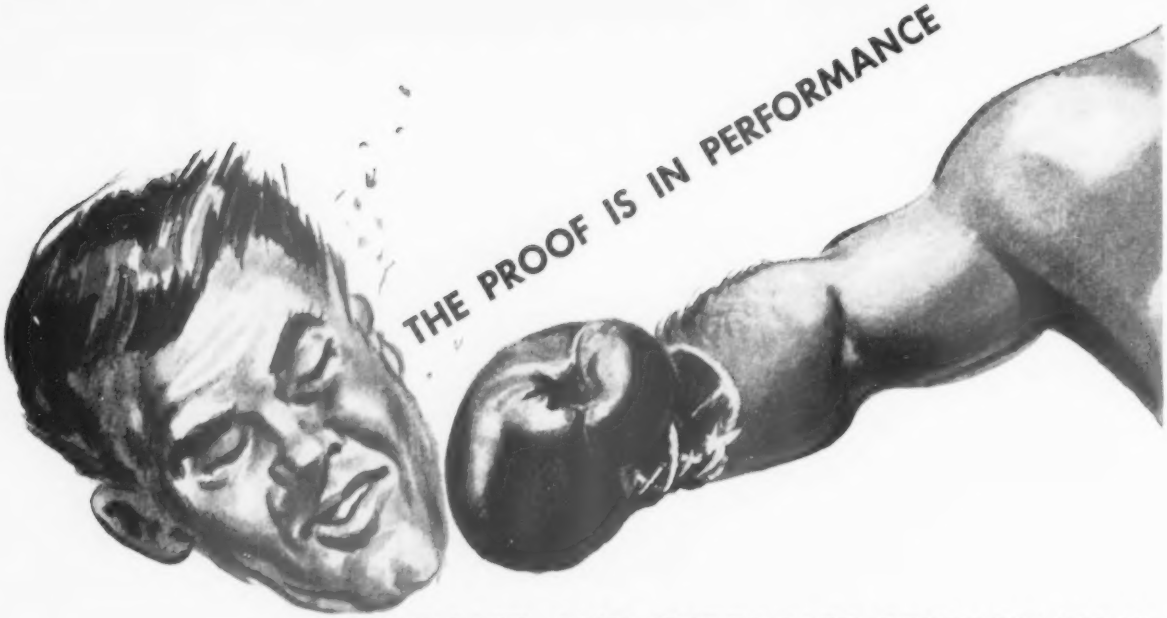

Generators and Regulators

Components for Aircraft Engines

All Electric Windshield Wipers

Ignition Coils


Diesel Fuel Injection Equipment



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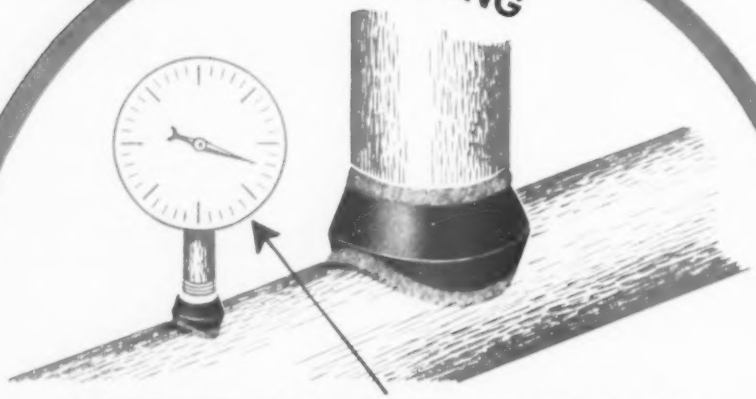
IS PRE-PROVED BY TESTING

WeldOlets
Butt-welding

Socket WeldOlets

ThredOlets



SPECIFY AND USE WELDOLETS AND THREDOLETS

Their predetermined performance standards are your guarantee of permanent piping. WeldOlet and ThredOlet design and performance are backed by Bursting Tests in accordance with A.S.A. B16.9 Code for Welding Fittings.

WELDING FITTINGS DIVISION

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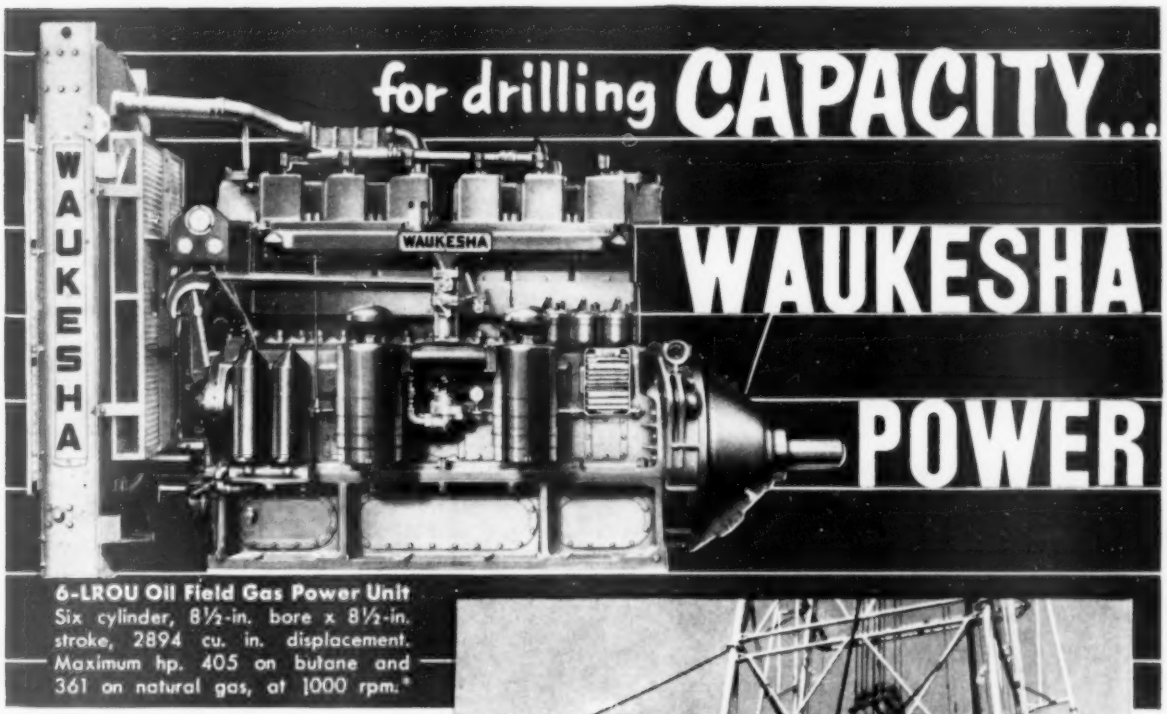


6-LROU Oil Field Gas Power Unit
Six cylinder, 8½-in. bore x 8½-in. stroke, 2894 cu. in. displacement. Maximum hp. 405 on butane and 361 on natural gas, at 1000 rpm.*

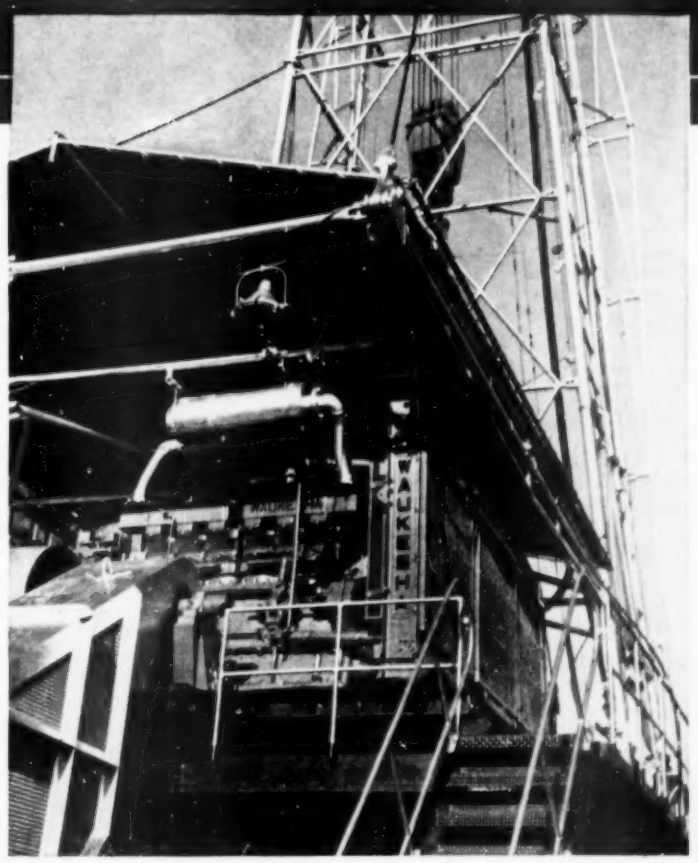
**OTHER MODELS—for gas, normal Diesel, or turbo-charged Diesel operation —to 570 horsepower.*

● Look at the rig's power plant. There's your proof of production. The capacity is there . . . the speed is there . . . the flexibility is there—with Waukesha Giant Sixes! Oil field favorites for over 20 years!

Each is a complete, independent power plant. With a radiator cooling system, self-contained lubricating system, heavy-duty clutch and power take-off. Or compounded for super power! High compression overhead valve, 6-cylinder, 2894 cu. in. gas engine—vertical design with box base, separate crankcase and separately mounted three-bore cylinder blocks. Renowned for reliability!

New *Oilwell* 76 rig shown has 3 Waukesha Giant Sixes. Bulletin 1560 tells *why*.

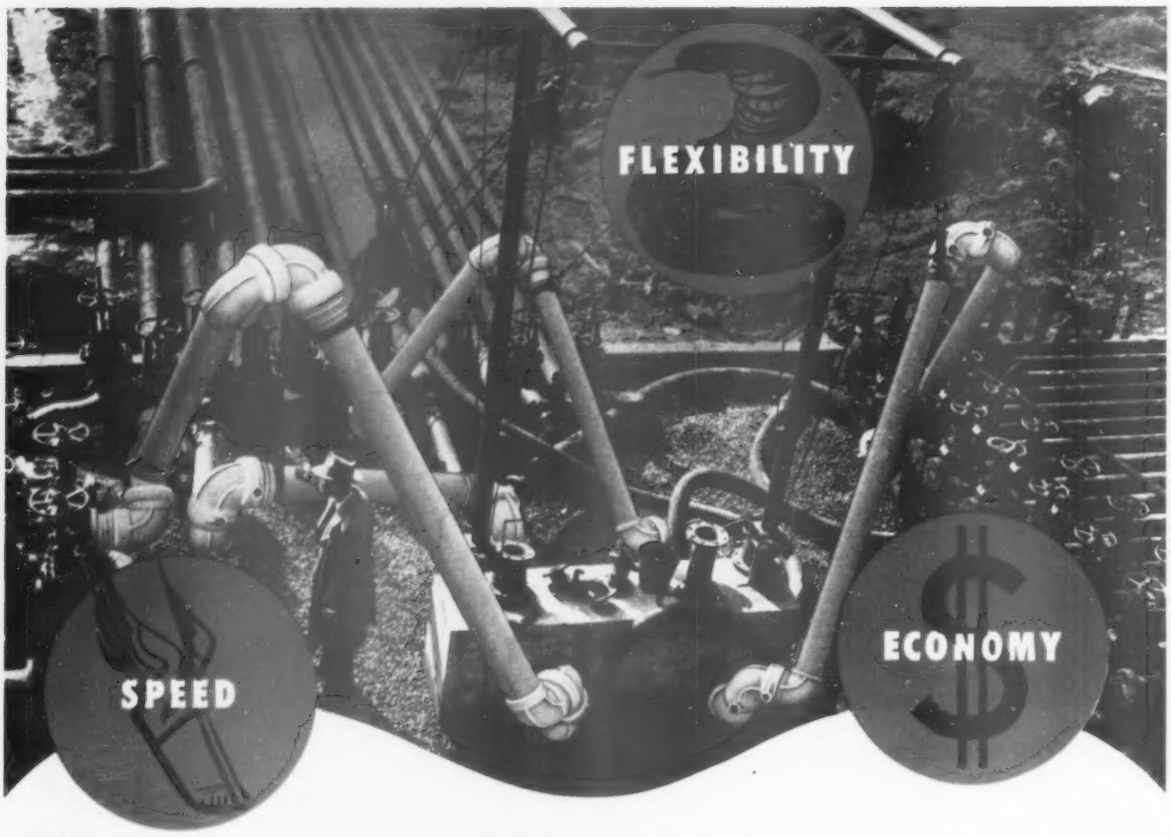
WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK TULSA LOS ANGELES



227

WAUKESHA

Diesel **OIL FIELD POWER** *Gas*



CHIKSAN Swivel Joints illustrated in this installation, facilitate the speedy, economical handling of various fluids through 16 lines from loading dock to manifolding pit — a distance of 800 feet. Since each line leads to a separate tank through the manifold, cross contamination is eliminated.

CHIKSAN Swivel Joints in the pump manifold above enable operator to pull base stock from outside storage into the plant and direct flow to proper vessel or proportioner.

The Flow of Enterprise Relies on

CHIKSAN

Ball-Bearing Swivel Joints

CHIKSAN Manifolding Saves 3 Ways!

- ✓ ORIGINAL INSTALLATION
- ✓ NO CONTAMINATION LOSSES
- ✓ LOW COST OPERATION

Original cost of CHIKSAN flexible line manifolding installations often run as much as 50% less than fixed line manifolding operations which incorporate costly multiple valve and line systems.

A CHIKSAN manifolding operation is simplified in its entirety — providing complete flexibility, mobility and ease of operation in limited spaces.

CHIKSAN manifolding installations reduce line hook-up time — keep pit floor clear of lines thereby providing greater working areas.

CHIKSAN manifolding operations facilitate the transfer of all types of fluids safely and rapidly under extreme climatic conditions with no possibility of cross contamination.

CHIKSAN manifolding installations are specifically engineered for long life — easy and economical maintenance, and render years of trouble-free operation.

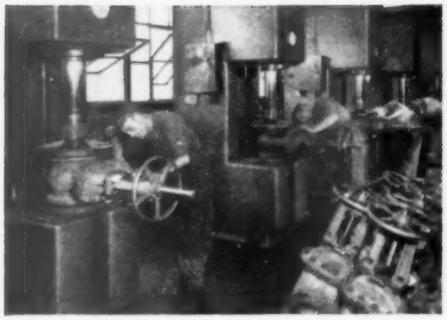
Our Engineering Research and Development Department will welcome inquiries on your manifolding problems.

Write for Catalog 53-C, Dept. OGJ-12

CHIKSAN

Representatives in Principal Cities

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 38, Illinois • Newark 3, New Jersey



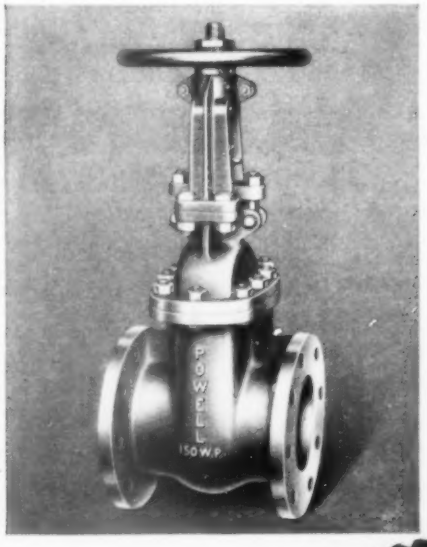
The Finishing Touch

Small details can make a big difference in trimming a tree . . . and in manufacturing valves. For example, *every* Powell Valve part must pass *rigid inspection*. Then, as a final, finishing touch, each Powell Valve is subjected to *actual line tests*.

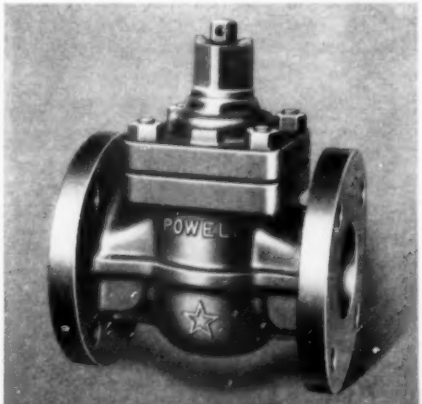
It's these seemingly small details that have helped Powell Valves maintain their record of dependability since 1846. Powell has probably done more valve research, solved more valve problems, and makes more types of valves than any other organization in the world.

With Powell Valves on the job in your plant, you'll say every day's a holiday from flow control worries. Following are just a few of the valves that have the gift of dependable service you want—and need. They're available through distributors in principal cities. If a distributor is not located near you, just write us. We'll be pleased to tell you more about these valves—and our complete line.

STAINLESS STEEL O.S. & Y. GATE VALVE *(Fig. 2453-G)* for 150 pounds W.P. at 500 F. Interchangeable solid or split wedges are precision fitted and accurately guided throughout entire travel. Sizes 2½" to 4", one-piece yoke; 5" to 30", separable yoke arms.



LUBRICATED PLUG VALVE *(Fig. 2201)*. Quarter turn of tapered plug opens and closes valve. Lubricant grooves surrounding parts provide positive seal. Seating surfaces not exposed when open. Semi-steel, 175 and 200 pounds W.O.G.; carbon steel, A.S.A. 150 and A.S.A. 300 pounds.



BRONZE "W.S." FULL FLOW GLOBE VALVE *(Fig. 2608)* for 200 W.P. Stainless steel seat and disc. Nominal pipe size opening through seat permits fuller flow with pressure drop and turbulence cut to minimum.

DEPENDABLE VALVES SINCE 1846

Powell Valves

THE WM. POWELL COMPANY · CINCINNATI 22, OHIO

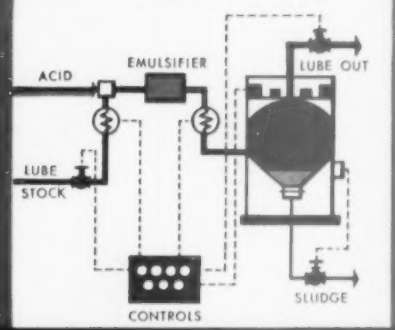
IF YOU ACID TREAT LUBE OILS OR SIMILAR STOCKS

PETRECO *Electric*

LUBE OIL TREATING

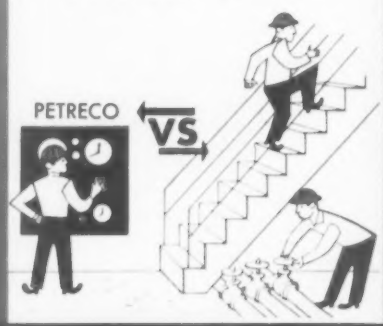
ASSURES BETTER, MORE ECONOMICAL ACID TREATING BECAUSE OF THESE OPERATING ADVANTAGES

CONTINUOUS OPERATION



Petreco electric lube oil treating operates continuously, eliminating the many manual operations of old-fashioned batch treating.

AUTOMATIC CONTROL



Automatic controls take time-consuming valve-twirling and stair-climbing out of acid treating. Precision control replaces guesswork.

HIGH EFFICIENCY

The powerful coalescing action of the Petreco electric field insures a fast, clean-break separation of the oil-acid mixture.

PL 53-

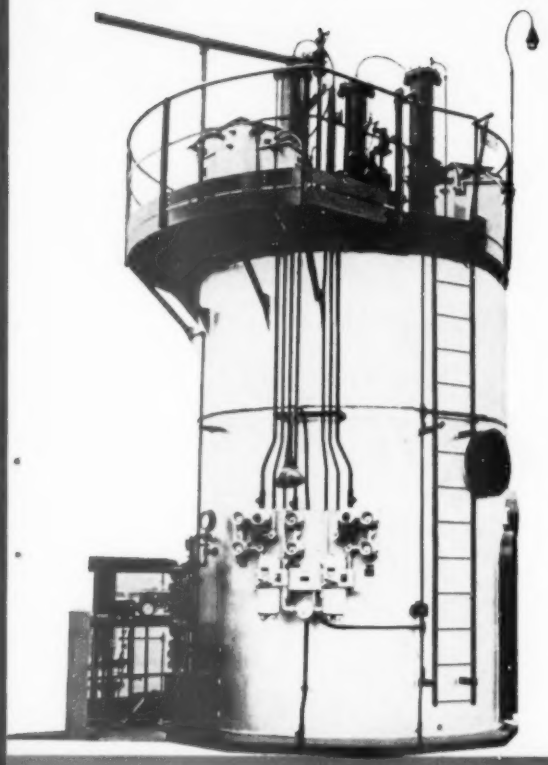
for complete information, call or write

PETROLITE CORPORATION

PETRECO DIVISION

3202 So. Wayside Drive, Houston 1, Texas

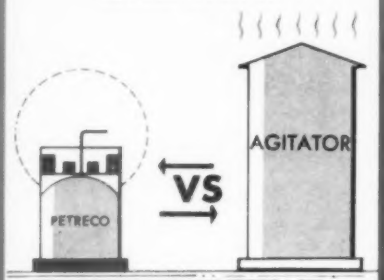
1390 E. Burnett Street, Long Beach 6, California



PETRECO ELECTRIC LUBE OIL TREATING applies modern refining practice to the acid treating of lube oils and similar stocks. The stock to be treated is thoroughly mixed with the pre-determined proportion of acid; the resulting mixture is then passed into the Petreco treater. The powerful action of the electric field precipitates the sludge, which is automatically and continuously drawn off. The treated oil passes overhead to the neutralization step.

Petreco treating takes the acid treating of lube stocks out of the manual operation, batch treatment category and puts it in the same class as other modern processes. It provides better, more uniform treating conditions, requires minimum operating attention and insures a rapid pay out.

CLOSED SYSTEM



In the Petreco process, treating is effected in a closed vessel, under pressure. There is no chance for acid spray or fumes to pollute the air.

LOW ACID REQUIREMENTS

The high separating efficiency of the Petreco treater permits the acid and oil to be intimately mixed. Less acid does more work.

IMPROVED PRODUCT

The very brief oil-sludge contact time prevents the continuing reaction of constituents dissolved by the acid, insuring excellent treated product quality.

PETRECO

ELECTRIC PETROLEUM PROCESSING

CRUDE OILS	**Removal of salts, solids, other impurities; dehydrating**
LUBE OILS	**Continuous, automatic acid treating**
DISTILLATES	**Acid treating, caustic treating, doctor treating**
FUEL OILS	**Desaponification, ash removal**

"SUCCESSFUL EXPLORATION *demands specialized instrumentation"*

SIE

Let SIE design custom-built seismograph instruments to meet your special requirements

Bid the good old days farewell, the easy prospects have all been worked. Today — geophysicists and instrument-builder's reputations are established on the tough ones. These areas demand that the geophysicist and instrument manufacturer work hand-in-hand to develop the new techniques and equipment required for successful exploration.

To meet this demand, SIE offers the experience gained in furnishing the geophysical industry with more than 200 complete seismograph systems. This experience insures that your special instrumentation requirements are met by the most complete development facilities in the industry, backed by acknowledged leadership in the construction of rugged and dependable seismic equipment.

Today — more than 100 of the world's leading geophysical organizations agree: "IT PAYS TO LET SIE BE YOUR LAB!"

SIE

SOUTHWESTERN INDUSTRIAL ELECTRONICS CO.

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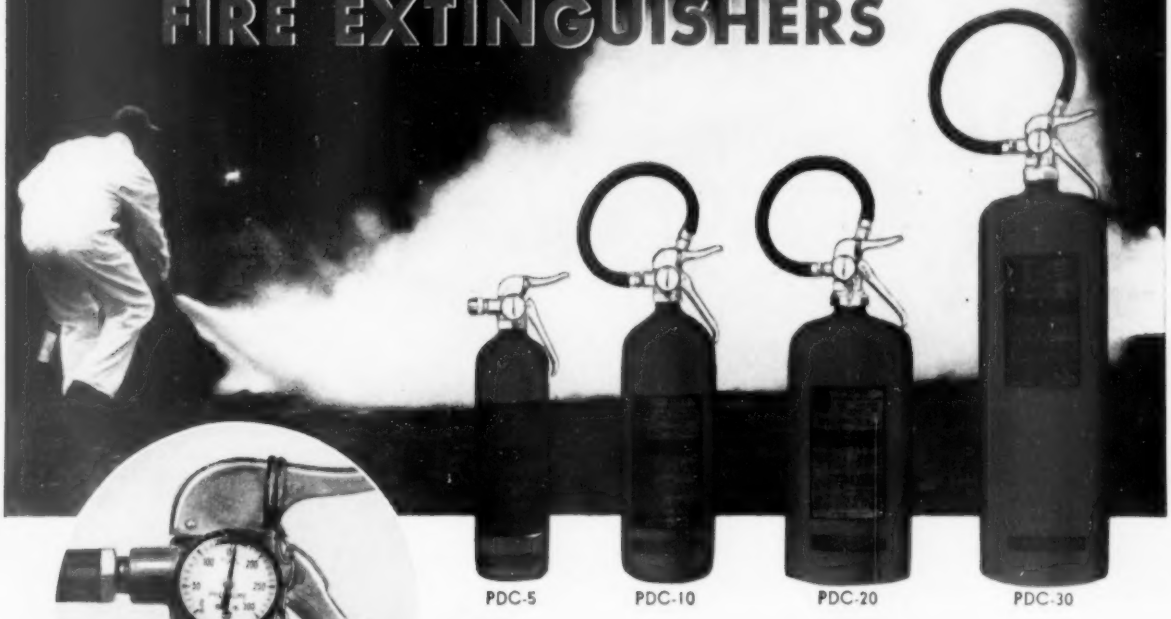
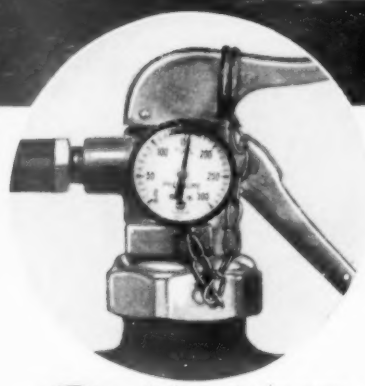
THEY'RE PRESSURIZED - READY TO GO!

New ALFCO DRY CHEMICAL FIRE EXTINGUISHERS



PDC-5 PDC-10 PDC-20 PDC-30



A glance at valve gauge indicates whether unit is in operating order.

Unmatched in Fire Smothering Efficiency!

WHEN FIRE HITS, THESE NEW ALFCO DRY CHEMICAL MODELS ARE READY TO STOP IT

With Valve and Siphon Assembly removed as single unit, ample size opening is provided for charging.

Simply pull pin and squeeze lever. No gadgets to operate, no last minute pressurizing from a gas cartridge or cylinder, no inverting, no bumping, no shut-off nozzle on the hose needed. They're ready to go!

Their fire-smothering efficiency is aided by a scientifically designed Alfco Discharge Nozzle which fans the Dry Chemical outward and downward in wide pattern and with great density. Their 150 (plus 25 minus 0) psi. air (or nitrogen) pressure maintains an excellently uniform duration of the Alfco Dry Chemical discharge pattern.

When partially operated, they can be left standing without loss of air pressure.

The Alfco Dry Chemical Valve is completely new also. It is ruggedly built. No special tools needed. Contains few parts. Equipped with Safety Relief Valve. Complete valve and siphon tube assembly removes as a single unit for recharging. They're water-tight, and noncorrosive. Tested for vibration and for operation at temperatures from minus 40° F. to plus 150° F. An Alfco Moisture Trap provides for pressurizing with air.

Write us for illustrated literature and full details of their special features.

Model numbers designate the capacities by weight of Dry Chemical.

Approved by Underwriters' Laboratories for Class B and C Fires.

With Total Dependability of Leadership in FIRE PROTECTION

AMERICAN-LAFRANCE-FOAMITE Corporation

ELMIRA · NEW YORK · U.S.A.

IN CANADA, LAFRANCE FIRE ENGINE & FOAMITE LTD., TORONTO

ALFCO

Saved $1,000.00

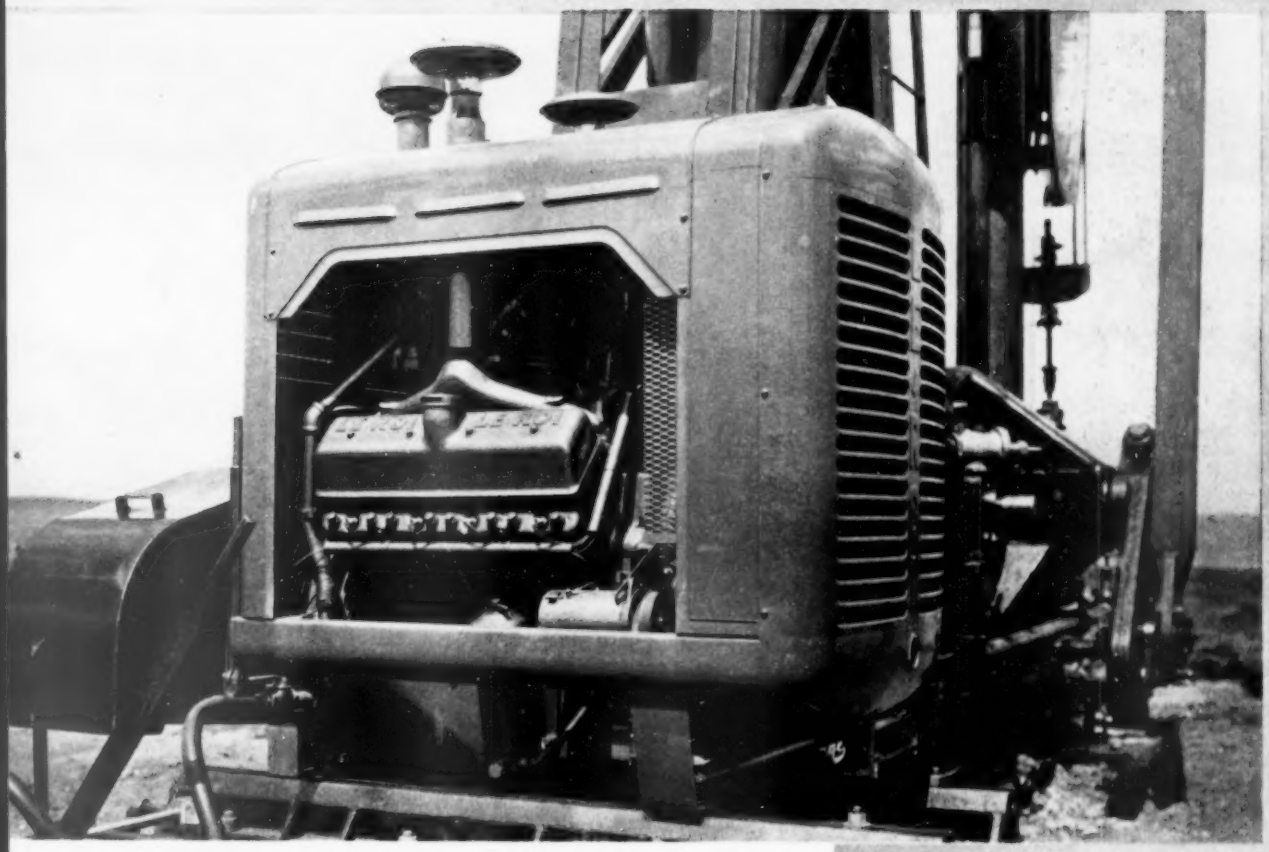
on prime mover for pumping unit

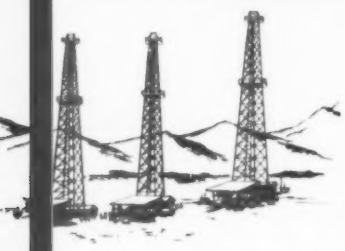
. . . and now enjoys small-engine operating economies

Uses Le Roi H540
(540 CU. IN.)

. . . instead of 800-cu. in. engine

—yet does same job!





IF you're cost-conscious (and you really have to be today), you'll be interested in this experience at an Anderson-Prichard Oil Co. installation.

They installed a Parkersburg Air-Balanced Pumper on an 8,000-foot well, to pump about 100 barrels of liquid per day. This Parkersburg is a 460,000-inch pound-unit with about a 19,000-lb. rod load and 120-inch stroke.

Usually, these units are set with an 800-cubic inch engine. However, Anderson-Prichard powers their pumper with a Le Roi H540, a 540-cubic inch engine, which handles the load easily.

By doing this, they made an initial saving of around $1,000.00. And — they put themselves in a position to enjoy the operating economies of a smaller engine.

Because Le Roi's keep expenses to a minimum — because Le Roi's have the versatility for all oil-field service — Le Roi installations are being made in an ever increasing number, for pumping, drilling, workover, gathering, pipeline pumping, power generation.

No matter what your engine application, it pays you to find out about Le Roi oil-field power from your Le Roi distributor or supply house. Ask them to show you some Le Roi installations.

LE ROI

LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland • Greenwich, Ohio

Oil Field Headquarters: Tulsa, Oklahoma

SERVICE

as near as your telephone

Complete parts stocks
Skilled mechanics on 24-hour call
Unexcelled overhaul facilities

Oilfield Sales-Service Network

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Le Roi Company Branch — Tulsa.
Carson Machine & Supply Co. — Oklahoma City.

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, New Orleans, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co. — Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co. — Great Bend.

Illinois — Western Kentucky
Western Machinery & Engine Company — Centralia, Illinois and St. Louis, Missouri.

Michigan
Haler Engine Service — Reed City.

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangely, Col.

Mississippi, Arkansas and Northern Louisiana
Ingersoll Corporation — Shreveport, Louisiana, El Dorado, Arkansas and Clarksdale, Jackson, Mississippi.

West Coast
Le Roi Engine Sales Co. — Long Beach, California.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

P-123

these steam traps won't freeze up!

This outdoor installation of Yarway Traps and Strainers in New Mexico gas plant completely eliminated freeze-ups.

Freeze-ups of outdoor steam traps in winter weather often cause production delays. Don't take that chance . . . especially when it's so easy to install Yarways, the steam traps that *won't freeze up.*

They won't freeze because condensate does not accumulate. The only moving part—a little valve—is continually testing for condensate, discharging it as soon as it forms. There's never anything to freeze.

Other reasons why over 850,000 Yarway Impulse Steam Traps have been sold—they get equipment hotter, sooner; light weight; small size; easy to install and maintain; good for all pressures; made of stainless steel.

More than 200 industrial distributors sell Yarway Traps and Strainers. See your nearest one today. For name, and free 24-page Steam Trap Book, write . . .

YARNALL-WARING COMPANY
136 Mermaid Avenue, Philadelphia 18, Pa.

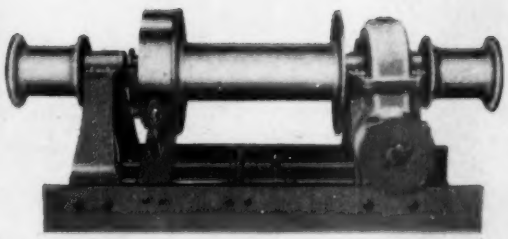
YARWAY

the steam trap designed with more production in mind

and Power to SPARE

IT'S A

Tulsa* Winch



Tulsa Winches are available for every make and model truck and crawler tractor in capacities from 6,500 to 80,000 lbs.

. . . And because it's a Tulsa Winch, you can be sure that each component part is engineer-designed. This precision is a "must" when you're depending on close control and positive power to move or load, lift or lower costly equipment. For detailed information and prices, contact your Tulsa Winch distributor or write . . .

Tulsa* Winch
TULSA, OKLAHOMA
DIVISION OF VICKERS Inc.

*Reg. U. S. Pat. Off.

always on the job making money for

Steady, dependable performance . . . that's what you get with Bucyrus-Erie spudders, whether the job is top-to-bottom drilling, workover, or tailing-in after rotaries. These modern mobile rigs are built to last, built to stand up to a steady diet of tough duty, with minimum time out for maintenance or repairs.

Here are a few important reasons why:

1. Rigidly braced frame, of all-steel, electric-welded construction, forms shockproof box which holds machinery and parts in accurate alignment.
2. Durable derrick is of latticed channel construction with horizontal and diagonal lacing members for added strength.
3. Rubber shock absorber in derrick head cushions shock, cuts vibration.
4. Brake and clutch adjustments are made easily — last long.

On-the-job dependability is one of many reasons why Bucyrus-Erie spudders lead the field. Your nearby distributor will be happy to tell you about the many additional reasons. See him soon!

6553C

BUCYRUS-ERIE COMPANY • South Milwaukee, Wisconsin

you
BUCYRUS ERIE
FIRST with the Finest in Spudders

from here up make it UNIBOLT and make it a better tree

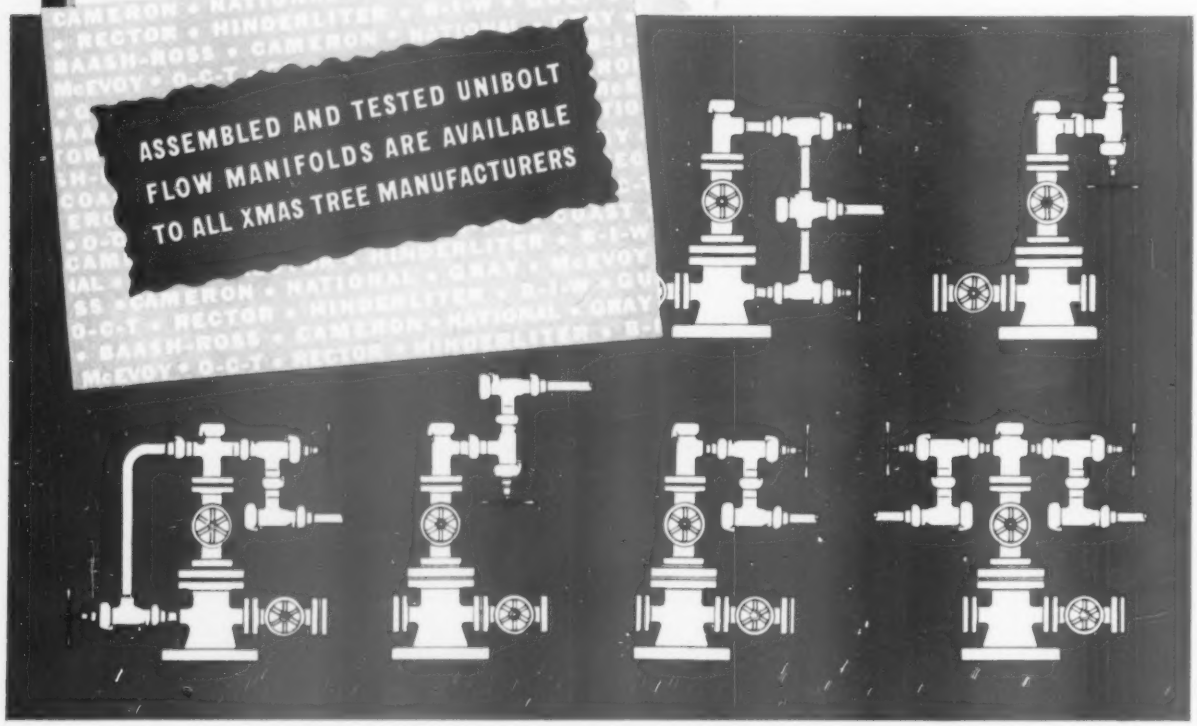
Ask your Christmas tree supplier to furnish UNIBOLT Flow Manifolds (everything above the master valve). These compact, completely salvageable manifolds, consisting of a Tee or Cross, Adjustable Wing Valve, and Positive Choke Body, are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more metal in shear, actually results in a higher factor of safety for the manifold.

Furnished in regular forged steel or in high-chrome alloy for corrosive wells — 6000, 10,000 and 15,000 lbs. test.

SINGLE WING • DOUBLE WING • DUAL COMPLETION • INJECTION

ASSEMBLED AND TESTED UNIBOLT FLOW MANIFOLDS ARE AVAILABLE TO ALL XMAS TREE MANUFACTURERS



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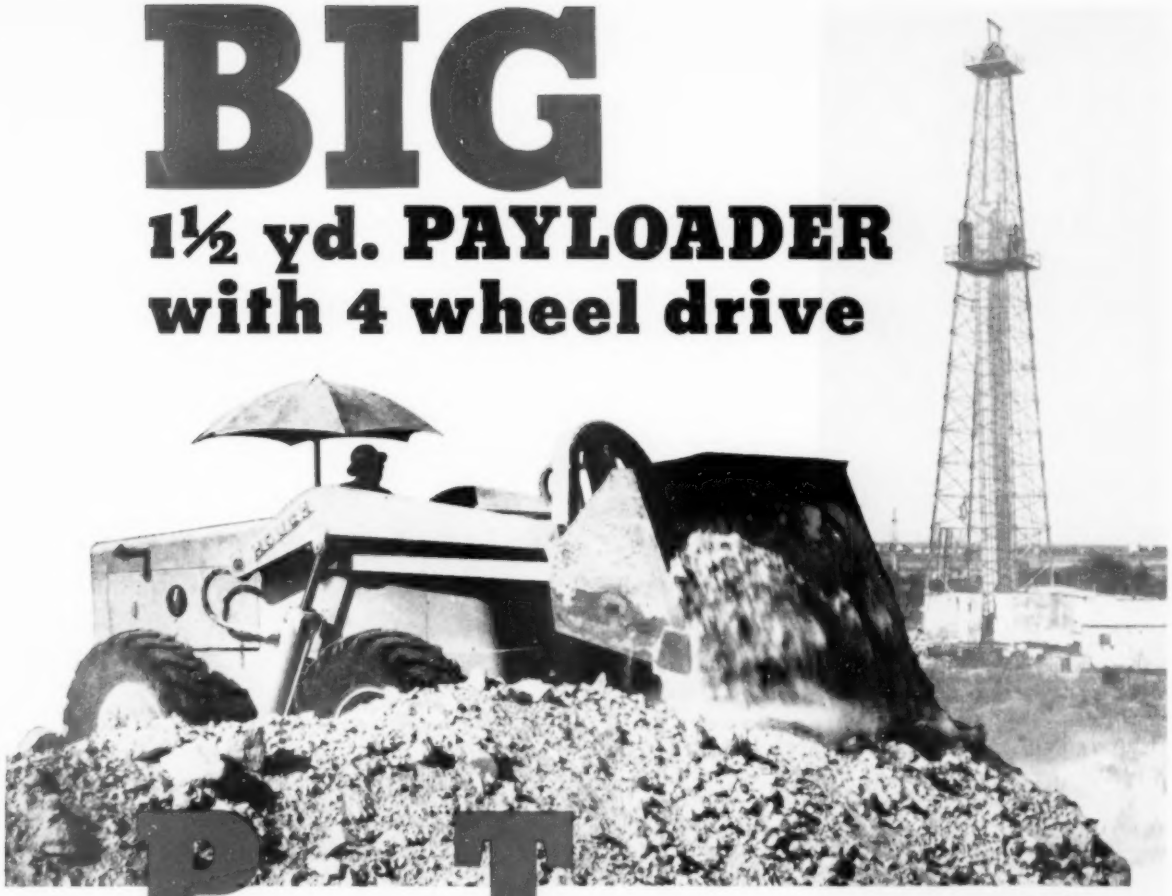
P. O. BOX 1184 HOUSTON, TEXAS

BIG

1½ yd. PAYLOADER with 4 wheel drive



Power and Traction for many tasks

build roads
level drill sites
dig sump pits
carry equipment
clear rights-of-way
build fire walls
load dirt and waste
push, pull, lift
dig, level, spread
backfill

This unusual tractor-shovel is a powerful, versatile earth and material mover that can travel to its work over highways or fields at speeds of 20 m.p.h.—and can do many jobs when it gets there. It digs, loads, levels, backfills, spreads, lifts, lowers, pushes and pulls.

Balanced weight on all four of the big drive wheels gives tremendous traction. Four gear ratios in both directions provide the right speed for every task. Fingertip action directs the double-acting hydraulic rams for positive, precise control of the 1½ cu. yd. bucket. Power-boosted steering insures fast maneuvering in mud or loose soil without operator fatigue.

Whether your interest is in production, pipe line or refining, you should see this "PAYLOADER" in action. Your "PAYLOADER" Distributor is as near as your phone with complete sales and service facilities. The Frank G. Hough Co., 749 Sunnyside Avenue, Libertyville, Illinois.

GET THE FACTS on the 4-wheel-drive "PAYLOADERS" — Models HM — 1½ yd. or HR — 1 yd.

Rear-wheel and front-wheel drive "PAYLOADERS" are also available down to 12 cu. ft. bucket capacity.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. • Since 1920

Rogers crews go everywhere
Throughout the world . . . wherever you plan to explore . . . you can rely on Rogers' equipment, techniques and experience. And speaking of experience, Rogers' crews have more than 500 man-years of world-wide service in petroleum exploration.
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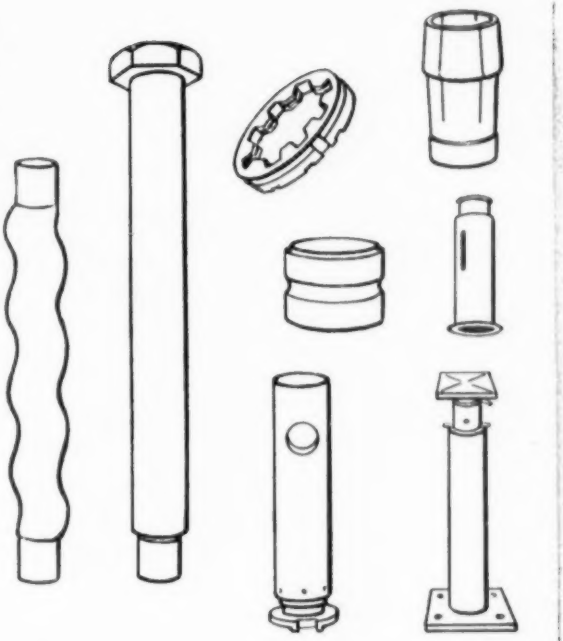


Take a closer look at the

ADAPTABILITY

of B&W mechanical tubing *You'll like it*

It would be difficult indeed to name any round hollow part or structural assembly that can't be *machined* or *formed* out of B&W Mechanical Tubing – at worthwhile economies in time, costs and materials. It will pay you, as it has so many others, to look into its great versatility and the opportunities it affords for cutting production expense and improving product quality.

B&W Mechanical Tubing—both seamless and welded – is available in stainless, alloy and carbon steels, in tempers, grades, finishes and sizes to suit any needs.

Call on Mr. Tubes – your nearby B&W Tube Representative – if you want help in determining the mechanical tubing best suited to your needs. Get the benefit of his long, close association with mechanical applications of all kinds to help you cut costs while keeping production high.

B&W SEAMLESS and WELDED TUBES

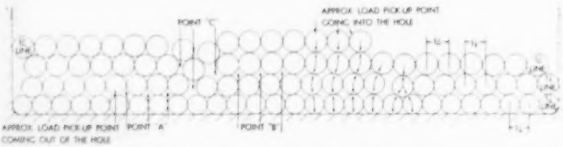
THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

TA-1747(C)

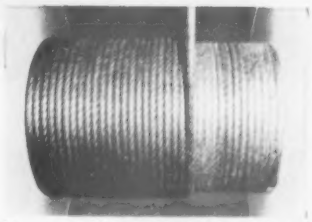
PAGES FROM THE LEBUS WIRE LINE SPOOLING HANDBOOK

PROGRESSIVE GROOVING

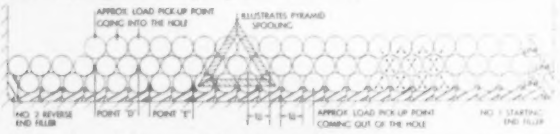
Eliminates WIRE LINE CUTTING IN!



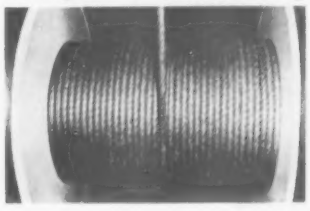
Above is an illustration of the plain drum spooling of a worn, tapered or stretched 1 1/8" wire line. Notice gaps, slipping over and cutting in at A, B, and C. Notice also amount of line needed for load pick-up when coming out and going back into hole.



These two photos show the second and third layers of line being spooled on parallel side of LeBus Grooved Drum. They further illustrate Progressive Grooving attained with LeBus Grooving.


APPROX. LOAD PICK-UP POINT COMING INTO THE HOLE
ILLUSTRATES PYRAMID SPOOLING
NO. 2 REVERSE END FILLER
POINT 'D'
POINT 'E'
APPROX. LOAD PICK-UP POINT COMING OUT OF THE HOLE
NO. 1 STARTING END FILLER

Above is a LeBus grooved drum with the same worn, tapered or stretched 1 1/8" wire line. NO GAPS, NO SLIP-OVER, NO CUTTING IN. NOTICE that less line is required for load pick-up when coming out or going back into hole.



In the past, one of the greatest sources of trouble in wire line spooling has been the wire line **CUTTING IN**. This is due principally to the haphazard or uncertain line action of helical spooling. With helical spooling, it is difficult to prevent worn line from slipping over while lifting excessively heavy loads. Under the new **LeBus System** of Controlled Pyramid Spooling where 75% to 85% of the wire line forms grooves for the succeeding wraps (illustrated by diagrams above and photos to left), we accomplish what is called **PROGRESSIVE GROOVING** with 75% to 85% of each layer of wire line wraps. By this method, **CUTTING IN** can be eliminated, since each layer of wire line is held in grooves formed by the preceding layer of wraps.

Regardless of speed used in your hoisting operation, with Progressive Grooving, there is a minimum of possibility for line to crowd over, or slip over out of the line grooves and allow **CUTTING IN** on the first, second, third, fourth, fifth or any number of layers of wraps; that is, unless the operator becomes careless as to **EXCESSIVE** line wear, the traveling block, hook and elevator being **TOO LIGHT**, or the line being spooled too loosely on the drum. Mechanically, the maximum of true Progressive Grooving and Pyramid Spooling is obtained with the LeBus Grooving and Controlled Pyramid Spooling System.*

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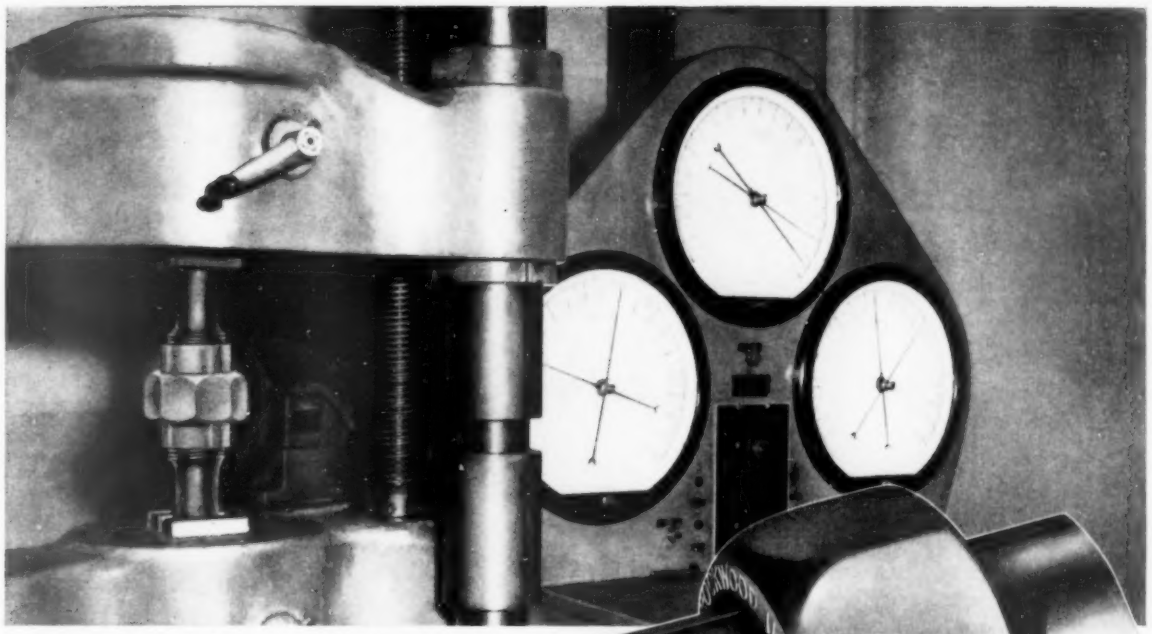

Higher Resistance to tough working conditions (expansion and contraction — shock, jar and vibration) is assured by constant testing of Rockwood Unions' tensile strength.

Tests prove

2-inch Rockwood Unions withstand average breaking loads of 82,000 pounds

Removed regularly from production for testing, Rockwood Unions prove strong under pressure.

The one-inch size withstands average breaking loads of 46,000 pounds, the two-inch 82,000 pounds. What's more, this strength is evenly distributed. Over-all balanced design makes all three parts equally rugged.

Remember, too, you get these additional features —

- Seats double-locked in place under 100,000 and 400,000 pound pressures
- Cold-forged seat joints made of non-corrosive stainless steel or Moly 341
- Plug-type, ball-to-cone construction makes piping alignment quick and easy, eliminates sharp corners and edges that scratch or damage
- "Rockwoodizing" — a special coating process — protects every Union against corrosion
- Absolute interchangeability of parts makes possible speedy replacements

Special Non-Corrosive Seats are a Rockwood Union feature. Specify Rockwood Type 602 Union with two stainless steel seats — or Rockwood Type 603 Union with two Moly 341 seats. Rockwood Unions are tested and listed by Underwriters' Laboratories, Inc., for use in handling flammable liquids and gases.

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Worcester 5, Massachusetts

Please send me further information on Rockwood cold-forged Steel Unions.

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ROCKWOOD
SPRINKLER COMPANY
MANUFACTURERS OF THE MOST COMPLETE LINE OF STEEL UNIONS ON THE MARKET
Worcester 5, Massachusetts

Explosion-Proof CONDULETS*

installed on machines that operate in flammable atmospheres

give YOU maximum protection from explosion and fire

Locations where flammable atmospheres are likely to be present are designated as hazardous by the National Electrical Code. The Code requires explosion-proof electrical installations on machines that operate in such locations or that handle flammable liquids or gases.

The inert gas machine shown at the right operates in a hazardous location. The manufacturer selected Crouse-Hinds' dependable explosion-proof Condulets to control the operation of the machine, to give protection against disastrous explosions and fire, and assure uninterrupted service.

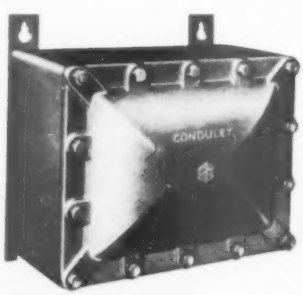
When you design machinery for use in hazardous locations select the very best electrical equipment . . . Condulets that are designed to meet Underwriters' Laboratories' standards. For nearly 50 years, Condulets have been of the highest quality, built from the finest materials, with painstaking care by skilled craftsmen.

The Condulet Catalog lists thousands of types and sizes of junction Condulets, lighting fixtures, plugs and receptacles, switches, controls, and circuit breakers for use in ordinary and hazardous locations. Tell us your electrical promblems. Crouse-Hinds engineers will gladly make specific recommendations.

Type EYS Explosion-Proof Sealing Condulet For Vertical Conduit Only

Type EZS Explosion-Proof Sealing Condulet For Vertical or Horizontal Conduit

Type EFS Explosion-Proof 4-Gang Condulet with 2 push-button stations, a double pilot light and 3 tumbler switches. Available in one to 5-gang sizes for all types of control devices.



Type EJB Explosion-Proof Junction Condulet. Used here to make power connections and enclose control devices.

*CONDULET is a coined word registered in the U. S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

A Nationwide Distribution Through Electrical Wholesalers

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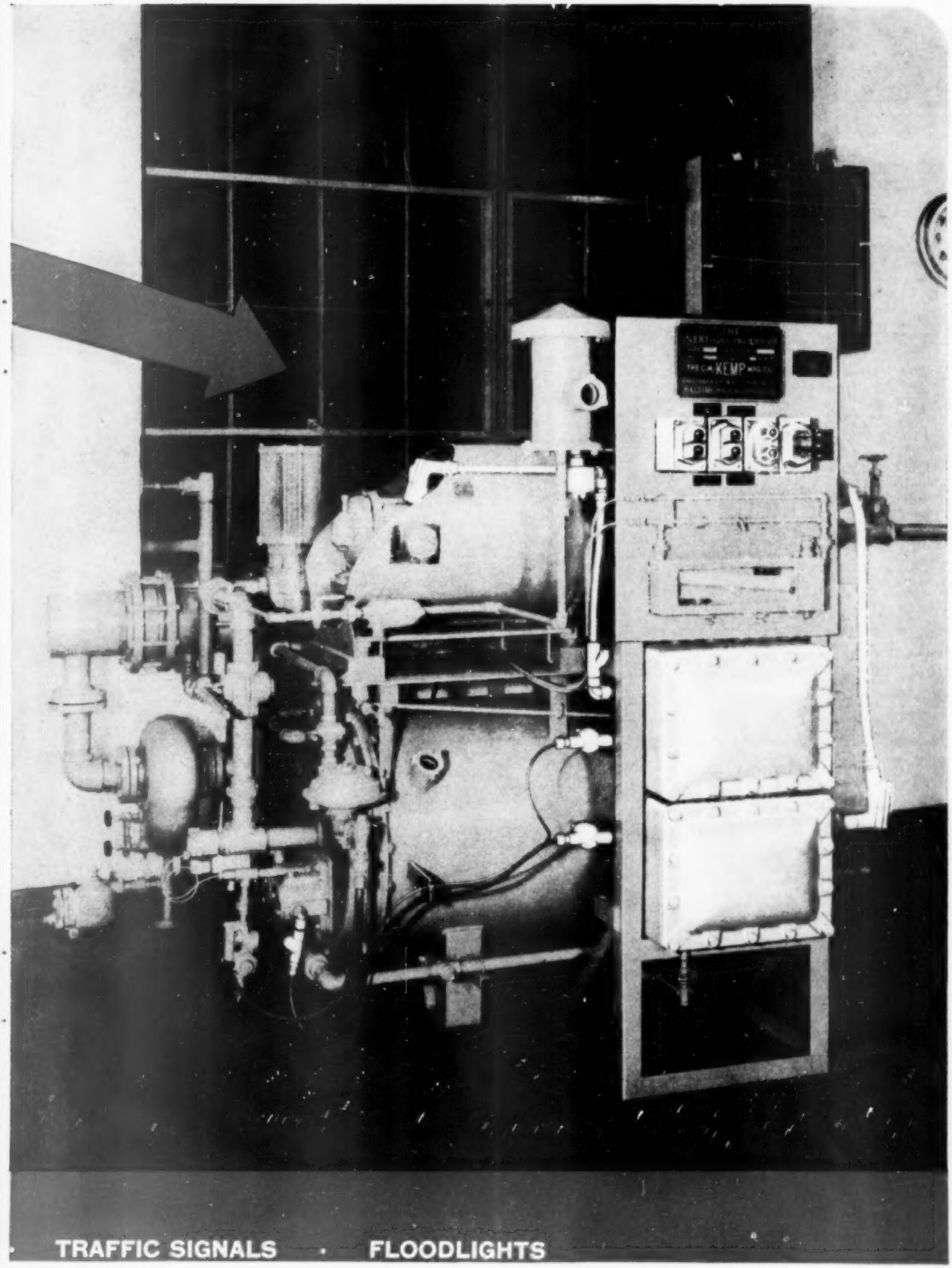
CONDULETS · AIRPORT LIGHTING

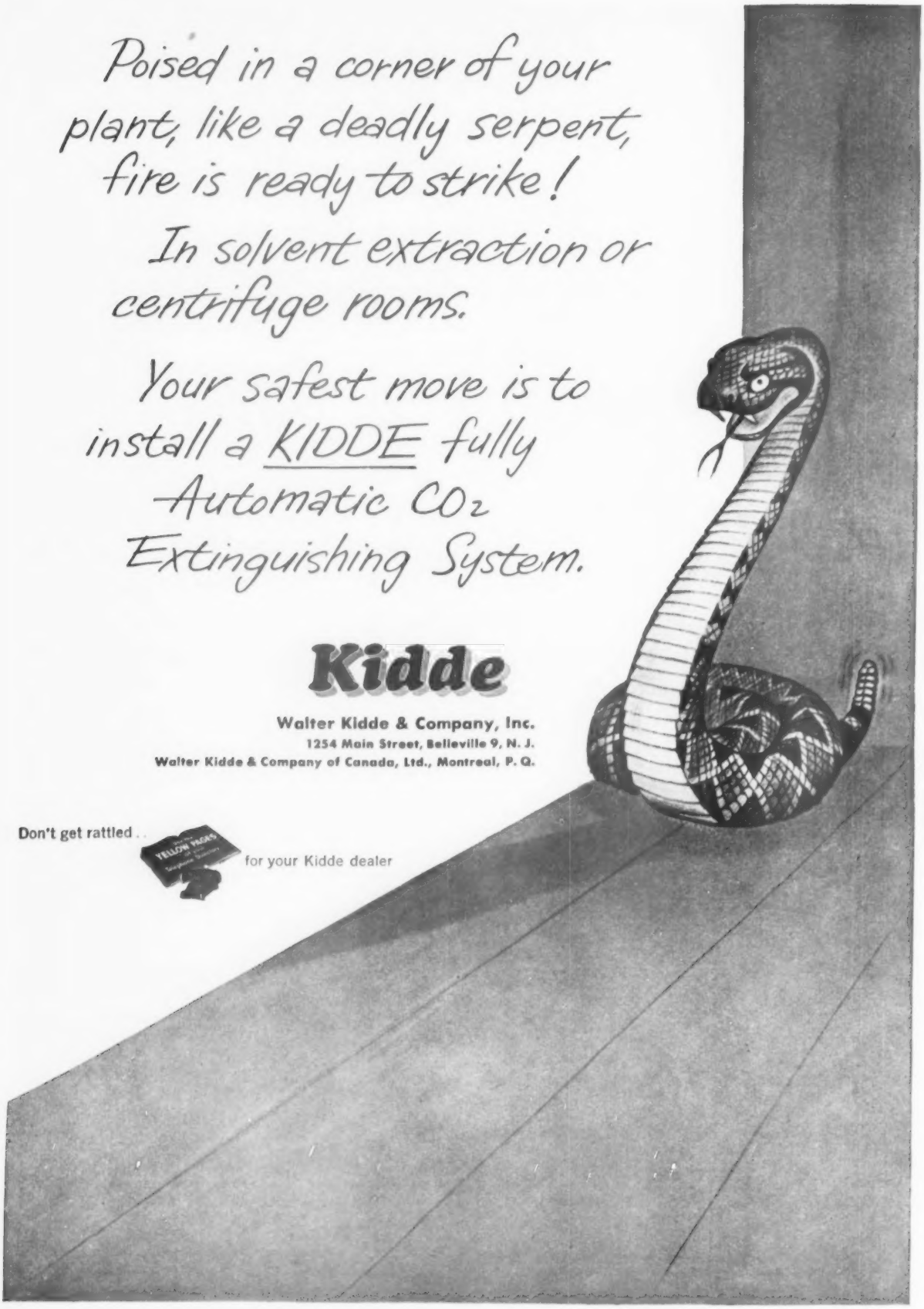


TRAFFIC SIGNALS · FLOODLIGHTS

Poised in a corner of your plant, like a deadly serpent, fire is ready to strike!

In solvent extraction or centrifuge rooms.

Your safest move is to install a KIDDE fully Automatic CO_2 Extinguishing System.



Kidde

Walter Kidde & Company, Inc.
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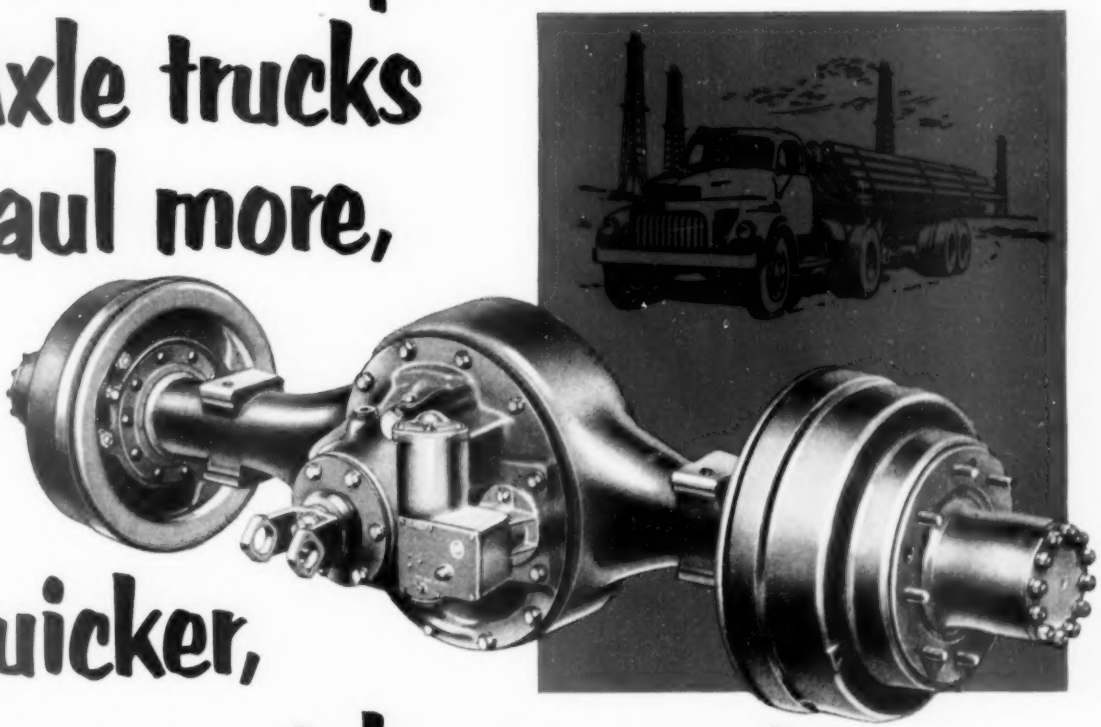
Performance Records* prove Eaton 2-Speed Axle trucks haul more,



quicker, longer, at lower cost, are worth more when traded-in

*More than a million-and-a-half Eaton 2-Speeds in trucks today!
For complete information, see your truck dealer.

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MANUFACTURING COMPANY
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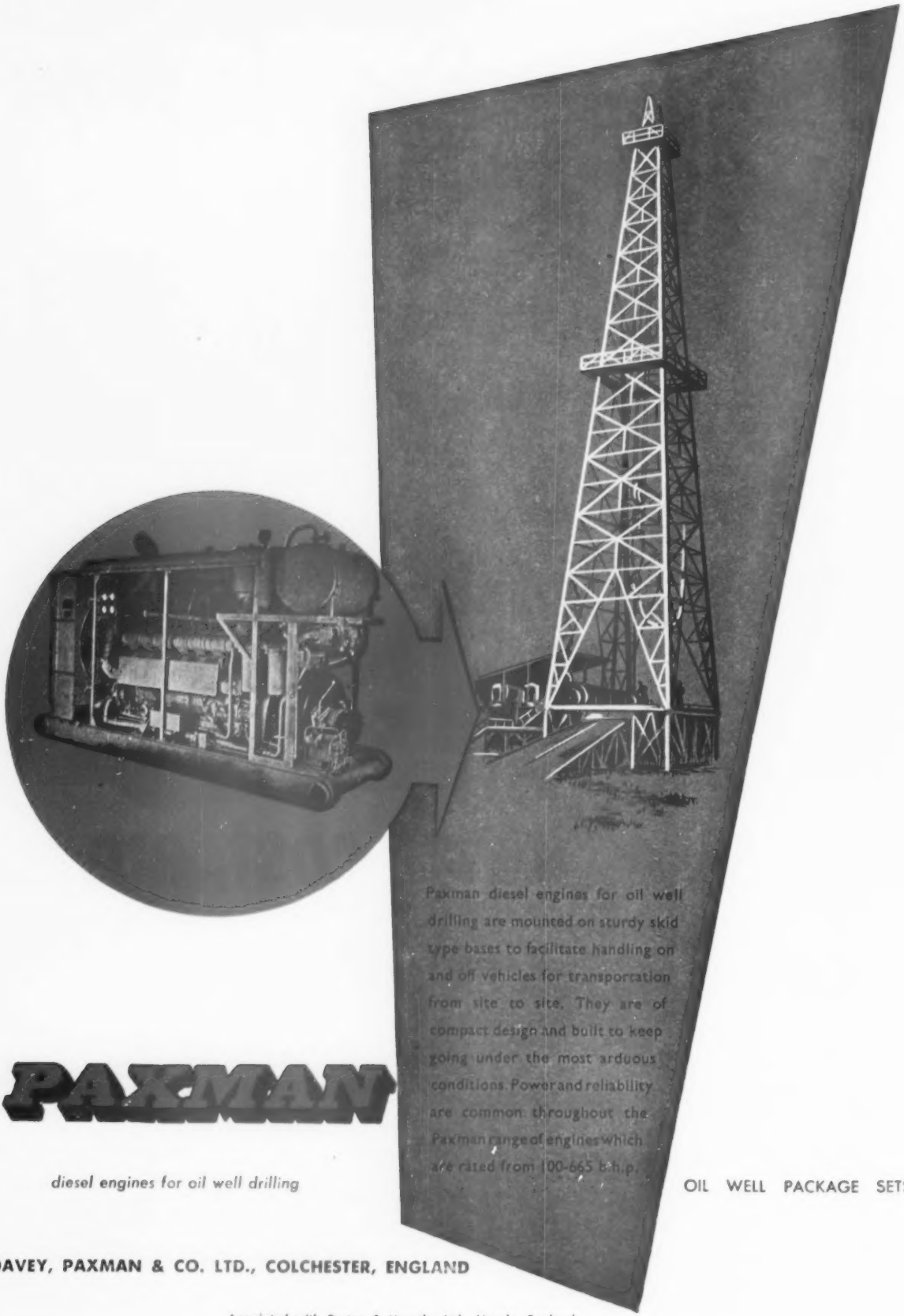
PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



Paxman diesel engines for oil well drilling are mounted on sturdy skid type bases to facilitate handling on and off vehicles for transporation from site to site. They are of compact design and built to keep going under the most arduous conditions. Power and reliability are common throughout the Paxman range of engines which are rated from 100-665 b.h.p.

PAXMAN

diesel engines for oil well drilling

OIL WELL PACKAGE SETS

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Associated with Ruston & Hornsby Ltd., Lincoln, England

DESIGNED FOR
complete service
ON THE LOCATION

2 things to remember about Gardner-Denver

1. All parts can be . . . and **are** . . . replaced on the drilling location.
2. Gardner-Denver's Service Specialists are fully trained and equipped to render this service.

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CONTINENTAL
Serving the Oil and Gas Industries

GO DEEPER "CHEAPER"

WITH B & B PREFORMED *Yellow Strand* ROTARY LINES

Yellow Strand Rotary Lines have been proved on the toughest oil field jobs. They've helped put down holes faster, farther, and at lower cost.

Yellow Strand is engineered to maintain its original rugged construction, there's no excessive stretching as heavier tools go deeper.

Yellow Strand's individual wires are of specification steel to give higher resistance to abrasion.

Yellow Strand is sold by Continental. Delivery is quick and supplies are backed by Broderick & Bascom's four factories and eight warehouses. Call your Continental representative for a Preformed Yellow Strand line to take you deeper, cheaper!

CONTINENTAL

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THE CONTINENTAL SUPPLY COMPANY

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FASTER

MORE EFFECTIVE... MORE DEPENDABLE

FIRE-STOPPING POWER

MODEL 20-B

ANSUL
Chemical Company
FIRE EQUIPMENT DIVISION • MARINETTE, WISCONSIN

ANSUL

FIRE EXTINGUISHING EQUIPMENT

FASTER . . . A short, quick downward motion of the puncture lever pressurizes the extinguisher and it is ready for instant use.

MORE EFFECTIVE . . . Even the inexperienced operator gets near-expert results because of the ease of operation and handling. In addition ANSUL *"PLUS-FIFTY"* Dry Chemical has greater fire-killing power.

MORE DEPENDABLE . . . Exclusive ANSUL-ENGINEERED design features include water-tight and corrosion-resistant construction, easy, on-the-spot recharge without special tools and other exclusive Ansul developments which insure greater dependability.

FIRE-STOPPING POWER . . . ANSUL FIRE EXTINGUISHERS have the highest ratings for fire-stopping power ever awarded any type of class B and C fire extinguishing equipment.

Send for File No. B-215. You will receive a variety of helpful printed matter. Included is our latest catalog which describes Ansul Extinguishers of all sizes — from the small Ansul Model 4 to Ansul Piped Systems and Ansul 2000 lb. Stationary Units.

OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES IN THE U. S. A., CANADA AND OTHER COUNTRIES

MANUFACTURERS OF
DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT, REFRIGERATION PRODUCTS, INDUSTRIAL AND FINE CHEMICALS AND LIQUEFIED GASES

Ready for any emergency

ROSS EXCHANGERS will keep these CATERPILLAR standby diesels running cool

REG. U. S. PAT. OFF.

Ready for instant action, this Caterpillar D364 Diesel Electric Set and its mate are on the alert to supply emergency power for a large, widely-known gas storage pumping station.

To provide dependable temperature control, Caterpillar Tractor Co. factory-installed two Ross Type BCF Exchangers on each engine: One to cool lube oil . . one to cool jacket water. *There'll be no overheating here!*

Ross Exchangers are also integral components of many other Caterpillar Diesel Engines supplying power for oil field drilling rigs, pipeline construction jobs, earth moving machinery, ditchers and work boats.

Ranked first for high thermal efficiency and ruggedness by first-ranking equipment builders, all-copper and copper alloy Ross Type BCF Exchangers are pre-engineered, fully standardized and promptly available. For more information, request Bulletin 1.1K5.

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DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

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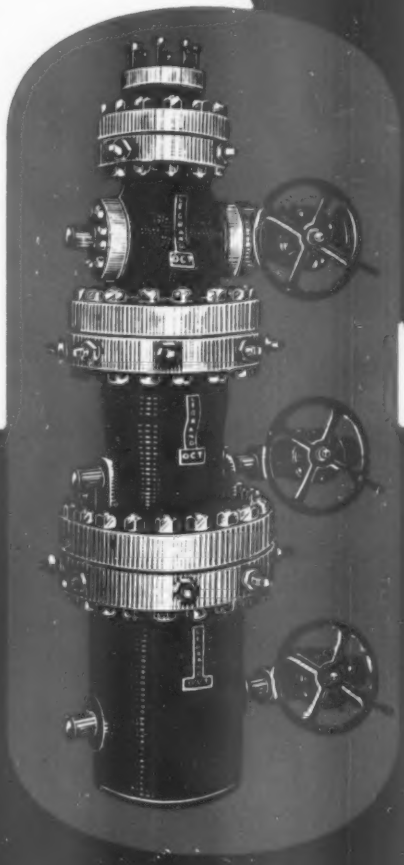
A UNIT FOR EVERY NEED



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Pumping Units are in service in many of the World's oilfields. They have many attractive features which make them the ideal choice for all pumping conditions.

Le Grand - O.C.T. wellhead and flow control equipment in a wide pressure range to suit all types of well is also manufactured under licence from the Oil Center Tool Co., Houston, Texas, U.S.A.

Details of our complete range of equipment will be sent with pleasure upon request.

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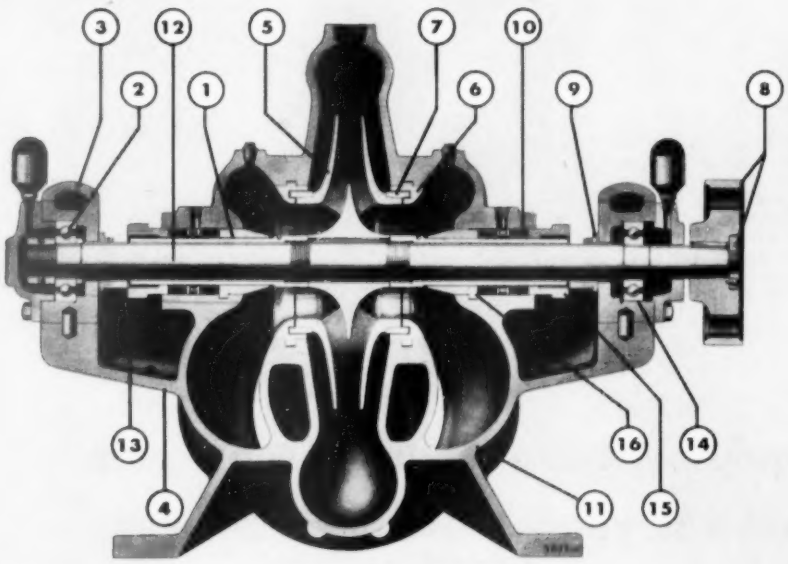
DE LAVAL
SINGLE STAGE CENTRIFUGAL PUMPS

for dependable industrial service



Labyrinth wearing rings minimize leakage...maintain high efficiencies

Labyrinth rings used in these De Laval pumps retard flow of water through labyrinth passage.

Flat rings showing relatively unimpeded flow of water.

(1) **Shaft Sleeves** are screwed on, to abut the impeller and make a water-tight joint. Sleeve expands freely and independently of shaft when temperatures change. There is no tendency to buckle.

(2) **Thrust Bearing** locates rotor axially.

(3) **Bearing Caps** easily removable for maintenance.

(4) **Bearing Brackets** scraped to lining bars for perfect alignment.

(5) **Impeller** hydraulically balanced, finished on all surfaces.

(6) **Labyrinth Wearing Rings** held accurately in machined grooves in both case and cover.

(7) **Impeller Wearing Rings** threaded on impeller, opposite to rotation.

(8) **Flexible Coupling** ground on all exposed surfaces and statically balanced, complete coupling supplied, pump half mounted on taper so that it can be easily removed. Check nut locks coupling on taper.

(9) **Deflector** keeps water out of bearing.

(10) **Stuffing Boxes** extra deep; lantern rings for water sealing.

(11) **Pump Case** horizontally split; machined to limit gages.

(13) **Steel Shaft** ground to limit gages.

(13) **Drip Boxes** large; provided with drain openings.

(14) **Radial Bearing** free to move axially, thus avoiding temperature strains.

(15) **Glands** split horizontally.

(16) **Protecting Bushings** renewable.

You can count on the performance of the De Laval Single Stage Centrifugal Pumps because they are precision-made to high manufacturing standards and incorporate the many quality design features shown in the cross-section.

They operate at high or low speeds, at high or low heads...with maximum efficiency.

For example, De Laval G, I and K Single Stage Double Suction Pumps have a capacity range of 175 gpm to 6,000 gpm, and heads to 300 feet. They are available in sizes ranging from 4" suction and 3" discharge to 14" suction and 12" discharge. Write for Bulletin 1002.

DeLaval also furnishes larger centrifugals for capacities up to 70,000 gpm.

DE LAVAL *Centrifugal Pumps*

DE LAVAL STEAM TURBINE COMPANY

810 Nottingham Way, Trenton 2, New Jersey

DL 109

C. H. Broussard, Vice President of Independent, started out as a helper for IX 15½ years ago after attending LSU and Georgia Tech. He has progressed through every job in the exploration field including computer, party chief, review department head, and chief geophysicist. He has a total of 17 years experience in geophysical work.

Experience, Equipment and Modern Techniques are the keys to your Exploration Success

Independent Exploration Company has contributed generously to the development of new equipment and modern techniques during the 20 years in which it has served the oil industry.

Now one of the oldest and most experienced exploration contractors in the business, Independent believes that experienced Party Chiefs hold a key to your exploration success. Independent's crews under the supervision of Party Chiefs with an average of 16 years service, have served more than 100 important oil producers.

POINTING THE WAY IXC FOR THE DRILL

Independent's Experience Merits Your Confidence

Independent *Geophysical Surveys*

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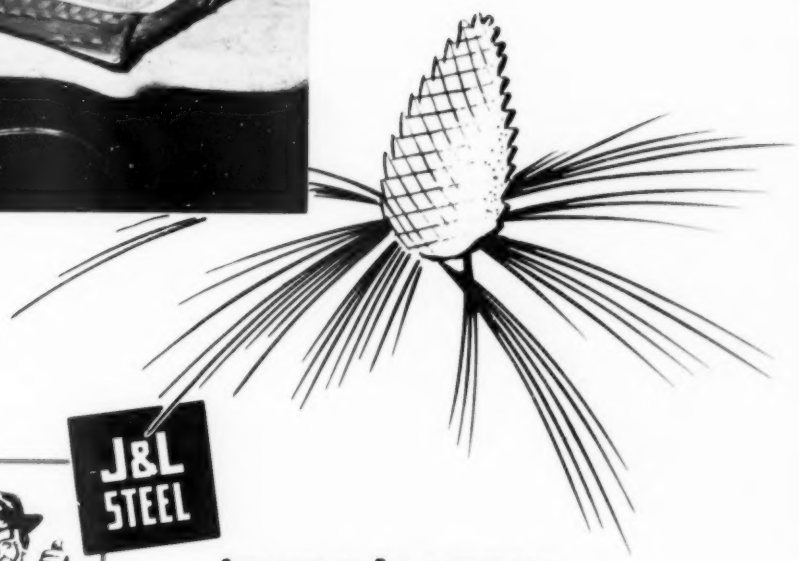
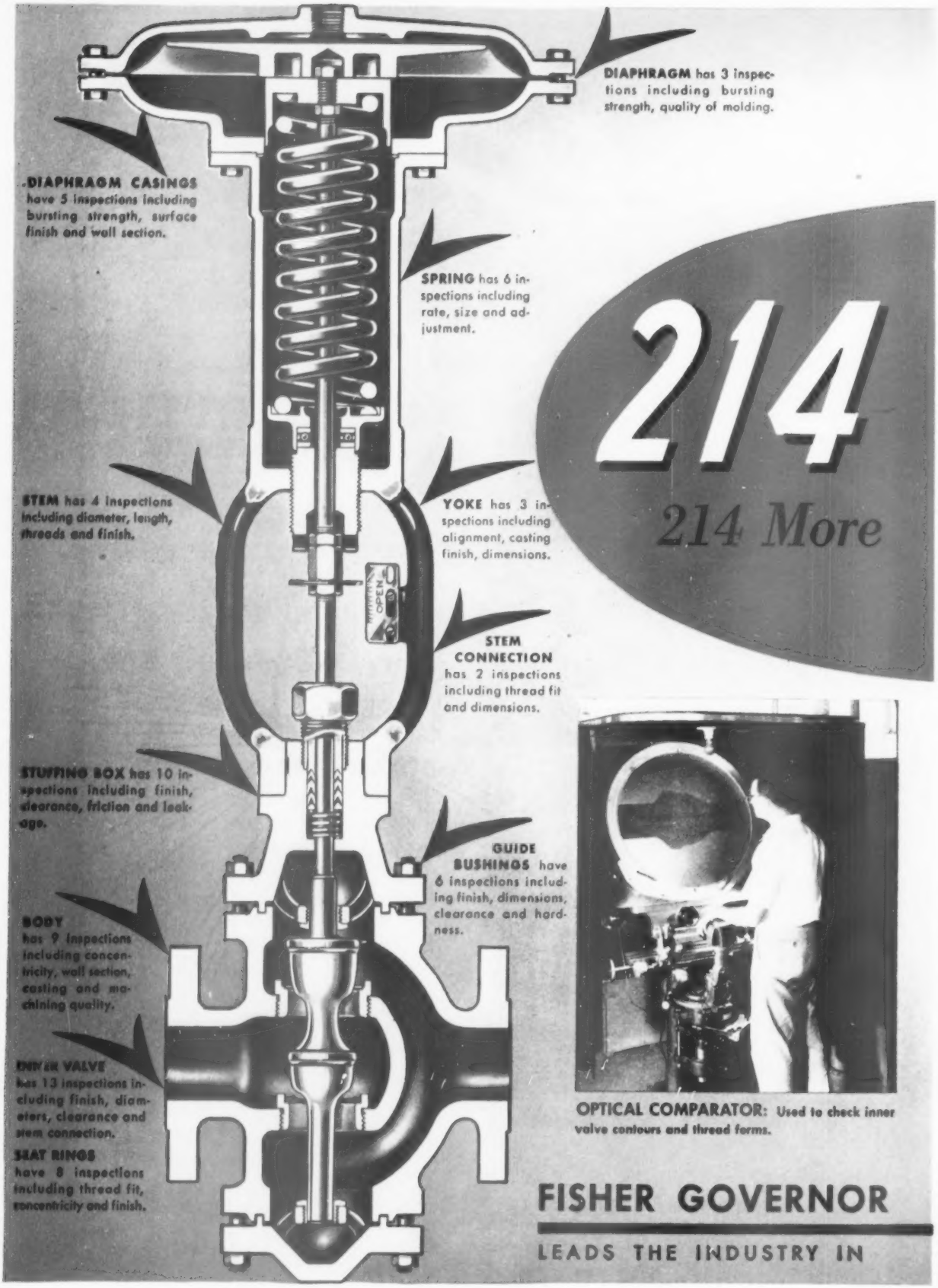


J&L STEEL

JONES & LAUGHLIN
STEEL CORPORATION
SUPPLY DIVISION


DIAPHRAGM has 3 inspections including bursting strength, quality of molding.
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214
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STEM has 4 inspections including diameter, length, threads and finish.
YOKE has 3 inspections including alignment, casting finish, dimensions.
STEM CONNECTION has 2 inspections including thread fit and dimensions.
STUFFING BOX has 10 inspections including finish, clearance, friction and leakage.
GUIDE BUSHINGS have 6 inspections including finish, dimensions, clearance and hardness.
BODY has 9 inspections including concentricity, wall section, casting and machining quality.
INNER VALVE has 13 inspections including finish, diameters, clearance and stem connection.
SEAT RINGS have 8 inspections including thread fit, concentricity and finish.
OPTICAL COMPARATOR: Used to check inner valve contours and thread forms.
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LEADS THE INDUSTRY IN

QUALITY CONTROL

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Inspections

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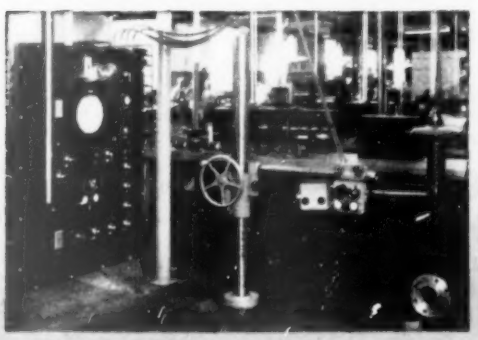
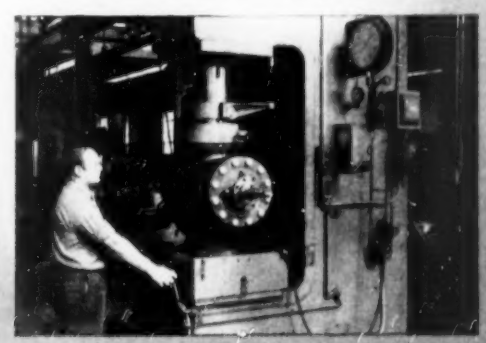
Pressure Regulators — Pump Governors — Liquid Level Controllers — Pilot Operated Regulators — Lever and Float Valves — Intermitters — Gas Regulators — Valve Positioners

Here at Fisher we believe that *inspection makes perfect.* That's why *every* Fisher Automatic Controller is subjected to an *expert* and *comprehensive* inspection procedure. Typical of this rigid quality control program is the inspection schedule of the Fisher Type 57T diaphragm motor valve illustrated, with a few of the more prominent inspections indicated. From "start to finish", a total of *214 inspections* assures *long trouble-free service* in meeting the most exacting operating requirements. Yes, this Fisher *insistence on perfection* is another example of why Fisher Automatic Controllers always give you *more for your money!*



HYSTERESIS TEST PANEL:
To detect misalignment, friction and check range of operation. Certified test certificates on specification.



HYDROSTATIC TESTING MACHINE:
Hydraulic pressure testing procedure for casting soundness, as prescribed by ASA.

COMPANY • Marshalltown, Iowa

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Since 1880

BURGESS-MANNING Pulsation Snubbers

included in NEW PLANT DESIGNS
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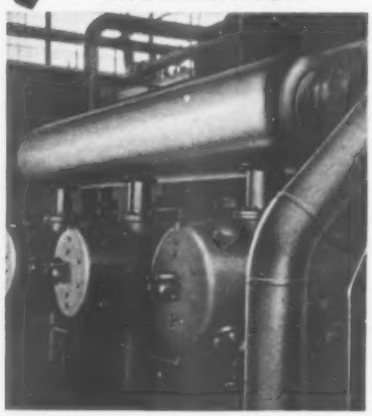
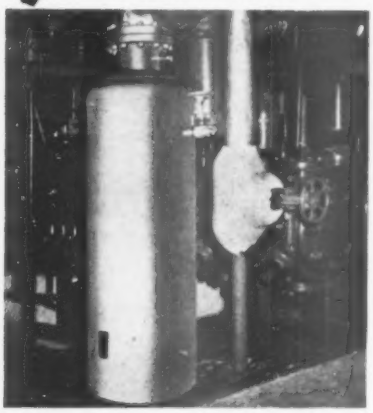
✓ TYPICAL GAS PIPE-LINE INSTALLATION



✓ TYPICAL CHEMICAL-PLANT INSTALLATION



Burgess-Manning experience and "know-how" in the control of surge in gas and air piping can be of valuable service to all processing, engineering, and contracting companies faced with designing piping systems without pulsation problems.

Pulsation snubbing has proven its effectiveness in best efficiency, process action, gas transmission, and gas metering.

To help you overcome pulsation and vibration in gas and air lines excited by compressors, reciprocating pumps, or blowers, Burgess-Manning Company's specialized engineering group is available to study and analyze flow conditions. Recommendations and designs for each project will be developed as required. Supplemental field surveys can be made where existing operations are involved.

If you are confronted with the problem of reducing pulsation in gas pipe lines, consult with Burgess-Manning. Recommendations for your piping projects will be developed at your request.

BURGESS-MANNING COMPANY

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5,850 sizes...and they all give all these advantages

MAYBE the tapered roller bearing you need is small enough to hold in your hand. Or maybe it's a whopper like the one in the upper left corner of the picture. Whichever it is—or any size in between—we can supply it. The Timken Company makes 5,850 sizes and 26 types of tapered roller bearings—one of which could be the answer to your bearing problem.

A wide selection of types and sizes is only one result of our more than 50 years of helping manufacturers with special bearing problems. Over those years, we've constantly improved our designs and quality. Today *any* Timken® tapered roller bearing you buy gives you all these advantages:

1. Tapered construction permits carrying radial and thrust loads in any combination.
2. True rolling motion and micro-inch surface finish to minimize friction.
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4. Positive roller alignment which gives maximum bearing capacity.
5. Made of Timken fine alloy steel, specially developed for long bearing life.
6. Case-hardened bearing surfaces that resist wear.
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If you're buying machinery, look for the trade-mark "Timken" on the bearings. If you're building machinery, specify Timken bearings. Or if you're replacing worn bearings, insist on Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

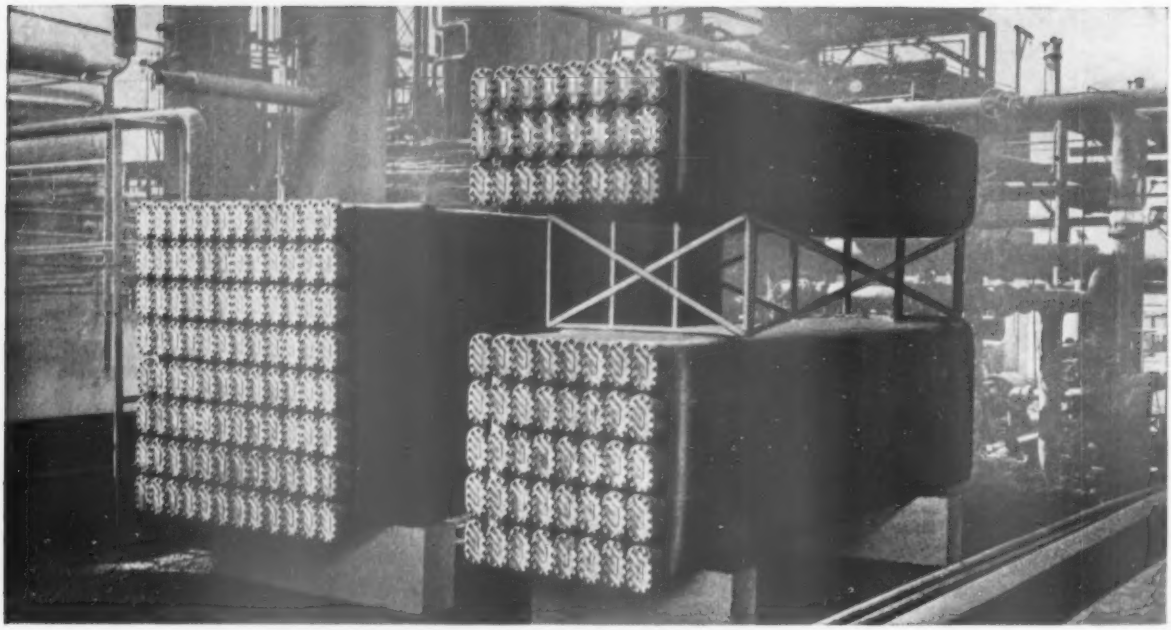
TIMKEN *TAPERED ROLLER BEARINGS*

TRADE-MARK REG. U. S. PAT. OFF.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⇕ AND THRUST →⇕← LOADS OR ANY COMBINATION

Six Reasons Why

you should specify



BROWN FINTUBE *Sectional* HEAT EXCHANGERS

FLEXIBILITY: If plant requirements change — and this is not uncommon — a "bank" of Brown Fintube heat exchanger sections can be disconnected and reassembled in different series-parallel arrangement easily and on short notice. "Bundle type" exchangers are not flexible. For them a change in duty usually involves designing — and waiting — for a whole new unit.

NO OBSOLESCENCE: Brown Fintube Sections never become obsolete. They can be used in one exchanger after another. Sections not in use serve as "standby" or parts, for other sections on stream.

REDUCED FOULING: Brown Fintube sections transfer more heat per lineal foot at lower surface temperatures. This minimizes coking. Also the longitudinal passages control the material flow eliminating eddies and reducing fouling.

EASY CLEANING: reduces maintenance costs. By manifolding just one extra parallel stream into an exchanger, the entire unit can be operated continuously — always clean — without ever coming off stream.

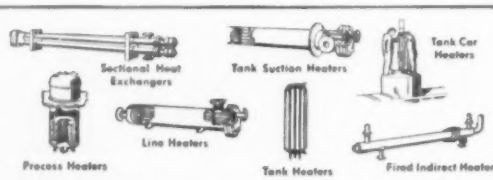
REDUCED STORES: Avoids tying up thousands of dollars in spare parts, housing and handling them.

PROMPT DELIVERY: Standardization permits economical assembly line manufacture from standardized parts — and prompt delivery.

If you heat — or cool — liquids or gases in your plant, you'll get a lot of ideas from our Bulletin No. 512. Send for a copy!

BROWN FINTUBE

BROWN FINTUBE CO.
Elyria, Ohio



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The straight, smooth inside bore of rugged CP Drill Collars eliminates washouts caused by offsets. Uniform outside hardness for the entire length of the collar greatly reduces rotation wear. Concentric, uniform thickness of wall sections provides rigidity throughout and perfect balance to overcome whipping and warpage — assures equal stress at all connections.

Threading is tailor-made to your specific requirements—all threads are hobbed on a thread mill for perfect uniformity and alignment. Available on special order in any length up to 55 feet. Write for Drill Collar Manual. *Chicago Pneumatic Tool Company, Oil Tool Division, 5000 U.S. Route 81 South, Fort Worth, Texas.*

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THREE CONE BITS • REAMING BITS • REAMERS • DRILL COLLARS • TOOL JOINTS • SUBS • JUNK BASKETS

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35,000 miles of A. O. Smith line pipe!

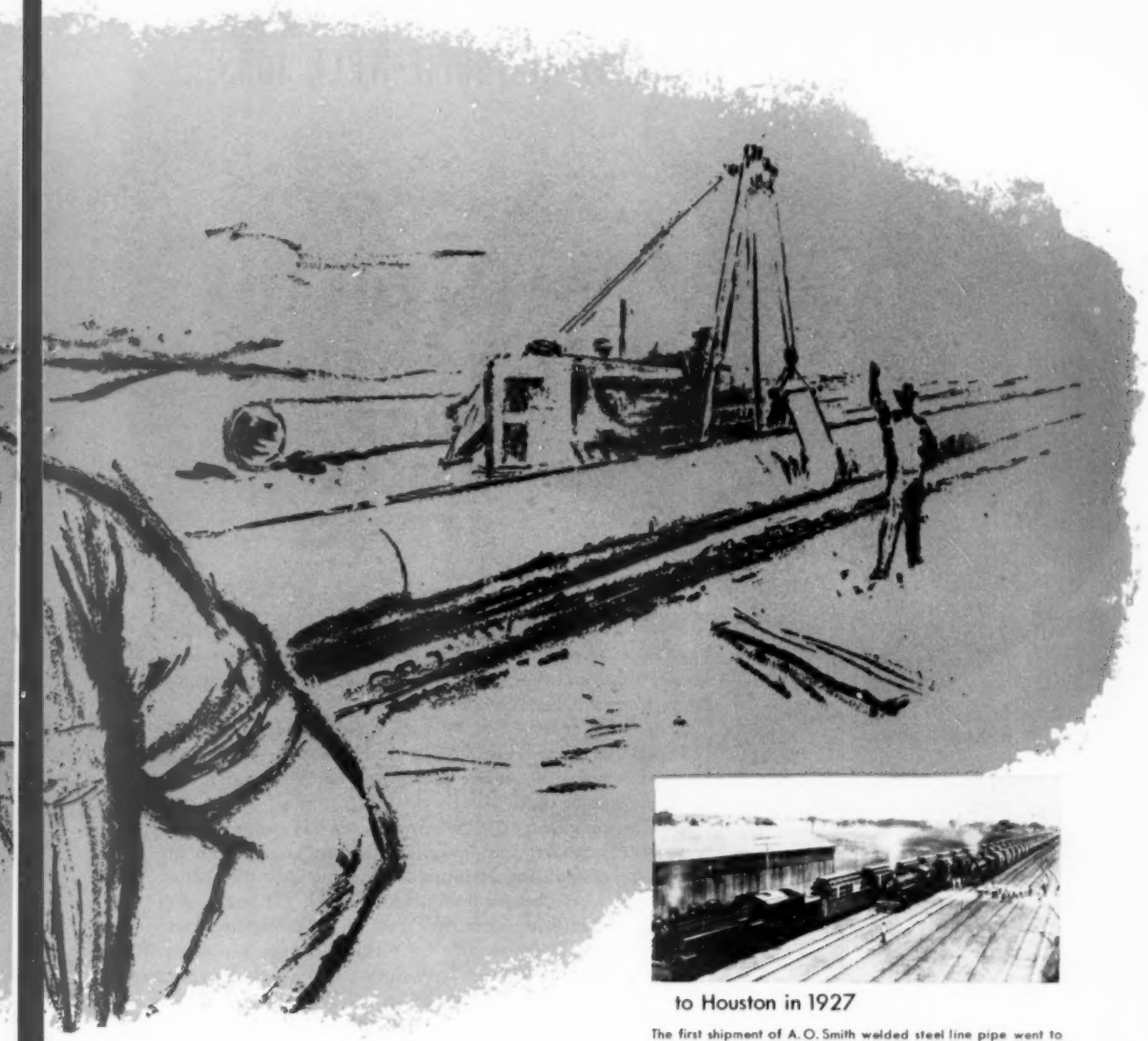
Pipe line contractors have laid 35,000 miles of A. O. Smith line pipe! They have assembled, welded and lowered in 5,263,549 tons of it, spanning mountains, deserts, forests, rivers and swamps, as well as rolling and flat farm lands. A herculean task, well done, that taxed ingenuity, men, money and machinery!

It all started in 1927 when A. O. Smith engineers developed and produced the first resistance-welded, large-diameter, thin-wall, high-strength steel pipe that virtually overnight launched a new industry! From it grew today's vast network of long distance pipe lines that transport natural gas, crude oil and refined products from one end of the country to the other.

The new A. O. Smith process meant hundreds of miles of large diameter pipe could be produced in weeks instead of years. More pipe lines could be built. Pipe could be supplied for more than one line at a time. This opened the field to more contractors who absorbed new millions of dollars of welding and construction equipment.

There has been no letup in our production. In 1950 we opened a new mill in Houston, with Sheffield Steel Corp., Houston, as our partner, to supplement Milwaukee plant production. Both of these mills produce identical quality pipe, flash-welded and internally expanded to meet the rigid requirements of strength and trueness which the industry demands. This means we are in position to keep big pipe line programs rolling.

A. O. Smith Line Pipe is available in a complete range of sizes and wall thicknesses, from 8⅝-in. to 36-in. diameters.



to Houston in 1927

The first shipment of A. O. Smith welded steel line pipe went to the Dixie Gulf Gas Company for construction of a gas line from Waskom to Houston and Port Arthur. The Milwaukee mill, today, has a capacity of 300 miles per month.

from Houston in 1953

Since 1950, A. O. Smith line pipe has also been shipped out of Houston. The A. O. Smith Corporation of Texas mill has a monthly capacity of 200 miles.

PROGRESS through RESEARCH and ENGINEERING

A.O.Smith

CORPORATION

LINE PIPE • CASING

Chicago 4 • Dallas 2 • Denver 2 • Houston 2 • Los Angeles 22
Midland 5, Texas • New Orleans 12 • New York 17 • Pittsburgh 19
San Francisco 4 • Seattle 1 • Tulsa 3 • Washington 6, D.C.

International Division: Milwaukee 1

first aid FOR MANY REMEDIAL WELL JOBS...

HALLIBURTON'S *versatile* DUMP BAILER SERVICE

Time costs plenty, so save all you can... choose the tool or service that does the job most effectively, and cuts precious hours from a tight schedule.

A growing number of operators call for Halliburton's Dump Bailer Service to handle vital remedial work. They know this versatile service means top performance... with a big savings in time.

Halliburton's Dump Bailer provides several major types of service: (1) placing a quick-setting cement used for covering the top of shots for a tamp; (2) plugging back the bottom of the well where excess hole is not desired; (3) running in the Halliburton bridging basket that can be set, opened, and dumped into simultaneously by picking up on the bailer, and (4) placing a Halliburton solution down hole to cover securaloy pipe in the casing string... and remove it within eight hours, replacing the old method of drilling out the pipe.

This all-around efficiency and versatility of Dump Bailer Service is the basis for its rapidly-growing acceptance by the nation's petroleum operators.

For top-notch remedial work – performed in the minimum of time – just call your nearby Halliburton representative for Dump Bailer Service. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

YEARS AHEAD IN REMEDIAL SERVICING!

HALLIBURTON

Look to WALKER-NEER
for Profit-Building
VERSATILITY

The Walker-Neer line of spudders is outstandingly versatile, 2 ways: First, each model is capable of handling any spudder job—workover or top to bottom drilling. Second, Walker-Neer gives you your widest selection of models and features.

Your Choice of 3 Spudder Designs, 9 Models

You have your choice of 3 basic designs, and 9 models, in Walker-Neer Spudders:

1. The three "C" models (C-33, C-34, C-37) combine all-job capability with the tremendous added advantage of a Full Width Calf Reel, for peak efficiency in workover jobs. This popular feature eliminates piling up and cutting in of wire line, and conserves power through operation closer to the core.

2. Walker-Neer's original "S" models (S-32 and S-33) feature the V-belt Driven Metal Band Wheel, for extra fast, hard-hitting strokes.

3. The giant S-310 and the new S-43 embody the key features of both designs, including Full Width Calf Reel and V-belt Driven Band Wheel—in the two most versatile spudders ever built.

Four-speeds-forward, plus a long list of pioneered features, add versatility to all Walker-Neer models*.

Walker-Neer's two-way versatility is a profit-building advantage that only Walker-Neer offers!

*The WS-31, rated to 1000 feet, and the WS-20, rated to 500 feet, are exceptions; they are designed solely for top to bottom drilling and provide one forward speed.

WALKER-NEER

MANUFACTURING COMPANY, INC.

P. O. BOX 2490 WICHITA FALLS, TEXAS

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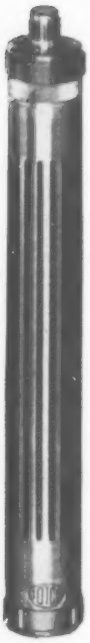
I *know*.. I use Totco

You'll see men who *know* choose the *Totco Recorder* time after time. In oil fields all over the world Totco has earned a reputation for accurate, reliable readings. Be sure *you* know... use Totco.

TOTCO *Recorder*



Technical Oil Tool Corporation
1057 N. La Brea Ave., Los Angeles 38, Calif.

EXCLUSIVE DISTRIBUTORS:

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Domestic—The Continental Supply Company
Canada—Oil Well Supply Division
United States Steel Company
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They Say—

Industry Completely Integrated

"What I would like to see . . . is an understanding throughout the entire country of the industry as a whole and an appreciation of the fact that as an industry it is essentially integrated.

"That is an ugly word in some quarters but I mean it just the same, because while some individual companies may choose to be integrated while others do not, the industry itself is integrated. If any one part of the industry breaks down the other parts are helpless and whatever they do is in vain.

"Some companies or individuals by their own choice confine their activity to exploration and the production of crude oil, some others both produce and refine, there are some who refine but do not produce, and there are some who market and transport without either refining or producing—but they are all essential links in the chain that reaches from a hidden natural resource to the end of a service station hose where oil finally begins to do its work. The industry in one sense is like a chain reaction."

H. S. M. Burns, president of Shell Oil Co., addressing the Texas Mid-Continent Oil and Gas Association, Houston.

Tax on Oil Properties Too High

"One fundamental problem with which the industry as a whole is confronted is the fact that generally the percentage of 100 per cent value assessed on oil properties is a great deal higher than that assessed on local properties.

"Of course, one of the reasons for this condition is that the cost of local government has mounted and it has been easier to let the oil properties stand the brunt of increased taxes. On the other hand, one major contributing factor is that the local properties are appraised in a more or less haphazard manner and not by experts, and oil properties by experts employed for that purpose. There is a trend in the direction of equalizing the ratio of assessments . . . but whether or not this trend continues depends largely upon whether the oil operators and companies continue to pay attention to their business in this respect."

E. I. Thompson, executive vice president of the Texas Independent Pro-

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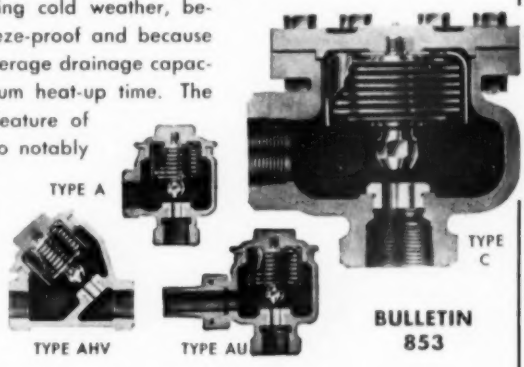

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ducers and Royalty Owners Association, addressing the annual ad valorem tax forum of the Mid-Continent Oil and Gas Associaion.

Court Decision Not Too Serious

"Natural-gas producers undoubtedly were disturbed and northern gas-using cities elated by the U. S. Supreme Court's refusal to review the holding of a lower court in the Phillips Petroleum Co. case. Independent gas producers see in this action a threat that strict federal regulation may be applied to them and their operations. The gas-using cities drawing their gas principally from the Southwest through interstate transmission lines see in it the hope of preventing any rise in their fuel costs.

"It may be that both the gloom and the rejoicing are premature and even unwarranted altogether.

"As it stands, the decision seems to apply only to the special conditions surrounding the sale of gas by the Phillips company—that is, its sale after the gas has been produced and gathered and passed through a gasoline-extraction plant.

"Any court decision which extends federal gas regulation closer to the point of production may be viewed as a threat of still further extension, but there is a difference between the threat and the actuality. Despite the court's action, there is at the moment little to indicate that producers of gas in general are any worse off than they were before."

From an editorial in the Fort Worth Star-Telegram.

Businessmen Helping Government

"Certain critics, who never objected to associating with crooks and Communists, are objecting to honorable businessmen serving their country. Others from self-interest, which seek personal advantage from fanning the dying embers of class struggle, also are joining the anvil chorus. Still others, who hope to slip back into national power and influence, are trying to kid the public again with cracks about business moving in on the Government and kicking out all the rest. This last I call unadulterated hokum.

"The relative handful of able and public-spirited businessmen is working in Government today shoulder to shoulder with representatives from agriculture, labor, science, engineering, law, medicine, and other segments of society and with members of the career service. They are building in this country a sound, humanitarian, forward-looking Government for all the people without the squandermania of spend-thrifts, the shame of corruption, or the taint of subversion.

"These conscientious men and women from all branches of American life are today in Washington solely to put something into good government instead of trying to get something out of bad government."

Secretary of Commerce Sinclair Weeks, addressing the Congress of American Industry of the National Association of Manufacturers, New York.

CALENDAR

JANUARY

11-15 Society of Automotive Engineers, annual meeting and engineering display, Sheraton-Cadillac and Statler Hotels, Detroit.

12-14 National Constructors Association, annual meeting, Hotel Commodore, New York City.

18-20 Pipe Line Contractors Association, sixth annual convention, Shamrock Hotel, Houston.

18-22 American Institute of Electrical Engineers, winter general meeting, Hotel Statler and Hotel McAlpin.

25-28 Plant Maintenance & Engineering Conference, Hotel Conrad Hilton, Chicago.

25-28 Plant Maintenance & Engineering Show, International Amphitheatre, Chicago.

27-29 Ninth annual symposium, "Instrumentation for the Process Industries,"

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FEBRUARY

1-5 National Association of Corrosion Engineers, annual short course in corrosion, Washington State College, Pullman, Wash.

4 Instrument Society of America, ninth annual regional conference, Hotel Statler, New York City.

11-12 Western Petroleum Refiners Association, regional meeting, Hotel Beaumont, Beaumont, Tex.

22 American Association of Petroleum Geologists, Rocky Mountain section, annual meeting, Albuquerque, N. M.

26 Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

1- 5 American Society for Testing Materials, spring meeting, Shoreham Hotel, Washington, D. C.

3- 5 American Petroleum Institute, Division of Production, Southwestern district, Rice Hotel, Houston.

4- 5 American Gas Association, transmission and storage conference, Jung Hotel, New Orleans.

8-10 American Institute of Chemical Engineers, Statler Hotel, Washington.

15-19 National Association of Corrosion Engineers, annual meeting, Municipal Auditorium, Kansas City, Mo.

17-19 American Petroleum Institute, Division of Production, Mid-Continent district, Biltmore Hotel, Oklahoma City.

23-April 1 American Chemical Society, annual meeting, Municipal Auditorium, Kansas City, Mo.

29-31 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

APRIL

4- 6 Texas Independent Producers and Royalty Owners Association, Rice Hotel, Houston.

5- 7 American Society of Lubrication Engineers, Netherland-Plaza Hotel, Cincinnati.

6- 8 Petroleum Industry Electrical Association, annual convention and exhibit, Adolphus and Baker Hotels, Dallas.

8- 9 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Townsend Hotel, Casper, Wyo.

12-16 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, annual meeting, St. Louis.

13-15 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

14-16 National Petroleum Association, fifty-first semiannual meeting, Cleveland Hotel, Cleveland.

21-23 Natural Gasoline Association of America, thirty-third annual convention, Baker Hotel, Dallas.

26-28 Southern Gas Association, annual convention, Houston.

MAY

2- 4 Independent Petroleum Association of America, midyear meeting, Cosmopolitan Hotel, Denver.

3- 5 American Geophysical Union, thirty-fifth annual meeting, National Academy of Sciences, Washington, D. C.

6- 7 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.

10-12 American Petroleum Institute, Division of Transportation, Products Pipe Line Conference, Warwick Hotel, Philadelphia.

10-13 American Petroleum Institute, Division of Refining, midyear meeting, Rice Hotel, Houston.

17-19 American Petroleum Institute, Division of Marketing, midyear meeting, Cosmopolitan Hotel, Denver.

24-26 American Gas Association, production and chemical conference, William Penn Hotel, Pittsburgh.

27-28 Natural Gas and Petroleum Association of Canada, Prince Albert Hotel, Windsor, Ont., Canada.

31-June 5 American Petroleum Institute, Division of Production, midyear committee conference, St. Francis Hotel, San Francisco.

JUNE

3- 4 Pennsylvania Grade Crude Oil Association, thirty-first annual meeting, Hotel William Penn, Pittsburgh.

6-11 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

13-18 American Society for Testing Materials, annual meeting and exhibits, Sherman Hotel, Chicago.

17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada.

27

July 1 Petroleum Equipment Suppliers Association, nineteenth annual meeting, Manoir Richelieu, Murray Bay, Que., Canada.

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TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

P. C. Lauinger, President; S. H. Rourke, Executive Vice President; Mitchell Tucker, Vice President and Advertising Manager; Hanson B. Pigman, Circulation Manager; Donald W. Wilson, Manager, Industry Census Department; J. Parker Holland, Production Manager.

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Subscription rate to the petroleum industry, United States and foreign, 1 year, $4.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1953 by The Petroleum Publishing Co.

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JOURNALLY Speaking

Subversive Shortage

NOW we learn that all the talk in recent years about running out of oil in this country is nothing but a Communist-inspired subversive plot.

This intelligence was uncovered, according to press reports, by Sen. George Malone of Nevada, in the course of hearings he is conducting into our national minerals policy. His discovery concerns the late Harry Dexter White whose name has been in the papers recently because he either was or was not promoted to a high post by a former president. It seems to have been established that White's hobby was passing secret documents to Soviet agents and doing similar little favors for those interested in enhancing the cause of Communist revolution.

Among other things, according to Senator Malone, White tried to promote a gigantic postwar loan to Russia for the development of her resources, the loan to be repaid over 30 years by shipping oil and minerals to the United States. To promote this loan, White wrote a report saying that this country is on the verge of running out of practically everything important. Our petroleum, he said, would be completely exhausted in 16 years. That was 9 years ago, in 1944. Ask any domestic oil producer how that prediction looks today.

We have always taken issue with the many prophets of gloom who are periodically predicting that we will run out of oil in X number of years. But we never before suspected that this talk was part of the Communist Party line. It just shows how gullible and naive we are, and how easily the Commies can pull the wool over the eyes of unsuspecting Americans.

Our theory was that such dire warnings sprang from nothing more than chronic pessimism and lack of understanding of geology and the nature of the oil business. But, now that we reflect on it, we realize that most of these predictions came from long-haired left-wingers who dominated professorial and governmental circles not so many years back, and that many of these leftish gentlemen have been accused of being Fellow Travelers, or Communist dupes, in many other respects.

So the horrid truth is now beginning to unfold. It's all a Soviet plot to make people think we are running out of oil, and thus lead up to the ruin of the domestic industry and the whole American economy. First we shut in our pitifully meager and fast-dwindling reserves (sic). Then we loan billions to Russia to develop oil there which we can buy back at the Soviet price. Then, when Russia has plenty of oil and money and we have little of either—bingo, Russia cuts off our oil and moves in on us without having to drop a single A-bomb.

Harry Dexter White's little plot failed (we didn't make the loan), but his philosophy about running out of oil is still kicking around. Watch out, there may be a Communist in every dry hole.

Full Endorsement

IT hasn't been very Christmasy around Tulsa of late—no cold, no snow, hardly even rain—but our calendar, and tell-tale, excited and secretive actions of the members of our family, indubitably prove that it's that time of year when we should begin to think about commencing our annual shopping spree.

Christmas is one thing on which we are not afraid to take a forthright and determined stand: We are in favor of Christmas.

We believe oil men generally endorse this stand, for we are beginning to see evidences in the arrival of Christmas greeting cards, and letters bearing Christmas seals. In fact, we received a letter from a particularly Christmas-minded drilling contractor in Montana which was plastered all over with seals boosting just about every worthy cause which issues the colorful little stickers.

That being the case, we hasten to fit action to words and implement our official attitude by herewith wishing all readers

Merry Christmas

—Henry D. Ralph.

What's NEW

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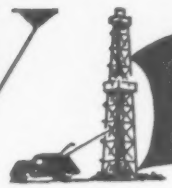

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International oil: Surplus today, needed tomorrow

THE oil industry throughout the world, viewed as a whole, is in very much the same position as the oil industry of the United States as regards current position and immediate outlook.

There is just a little too much of it for present consumptive demands. It has completely caught up with the growth in market requirements. It has rebuilt wartime destruction, supplied postwar economic reconstruction, survived the Korean crisis, and compensated for the loss of Iranian output. It has expanded proved reserves, crude producibility, transportation facilities, and refinery capacity to the point where all are, generally speaking, slightly in surplus.

This situation is causing some difficulties. The prospect of excess supplies brings up fears of cutthroat price wars and contraction rather than expansion. However, these difficulties are to a large extent psychological. Readjustment is needed more in the attitude of the industry's operators than in actual operations.

DEMAND for petroleum products, world wide, is increasing and there is every prospect that it will continue to rise for several years at least. Only it's not going up as fast as during many recent years. Business is still good; just not quite so lush.

Certainly there will be increasing pressure to sell oil anywhere in the world market, including the United States, and this will be countered with protectionist and other defensive proposals.

It is to be hoped that this keener competition will not lead to permanent trade barriers compartmentalizing the world's markets and channelizing the world movement of petroleum. For the current world surplus is undoubtedly only temporary, and in a few years the expanded markets will call for flexibility and freedom of choice.

IN the meantime, particularly in 1954, the world's oil industry needs a degree of restraint and factual reexamination. Many expansion plans could well be slowed down or postponed a little to let consumption catch up. Oil left in the ground will be worth more in a couple of years than if forced on a glutted market now.

The world's markets can consume just so much oil at any given time. If producers and refiners engage in a headlong scramble to force their output into places where it isn't needed they will be expending needless energy for short-term and ephemeral gains.

But if all areas with surplus oil realize that the period of rapid expansion is over and will be content with moderate gains, there is every reason to believe that surpluses can be worked off steadily and that before long the world's expanding economy will again call for another spurt in oil activity everywhere.

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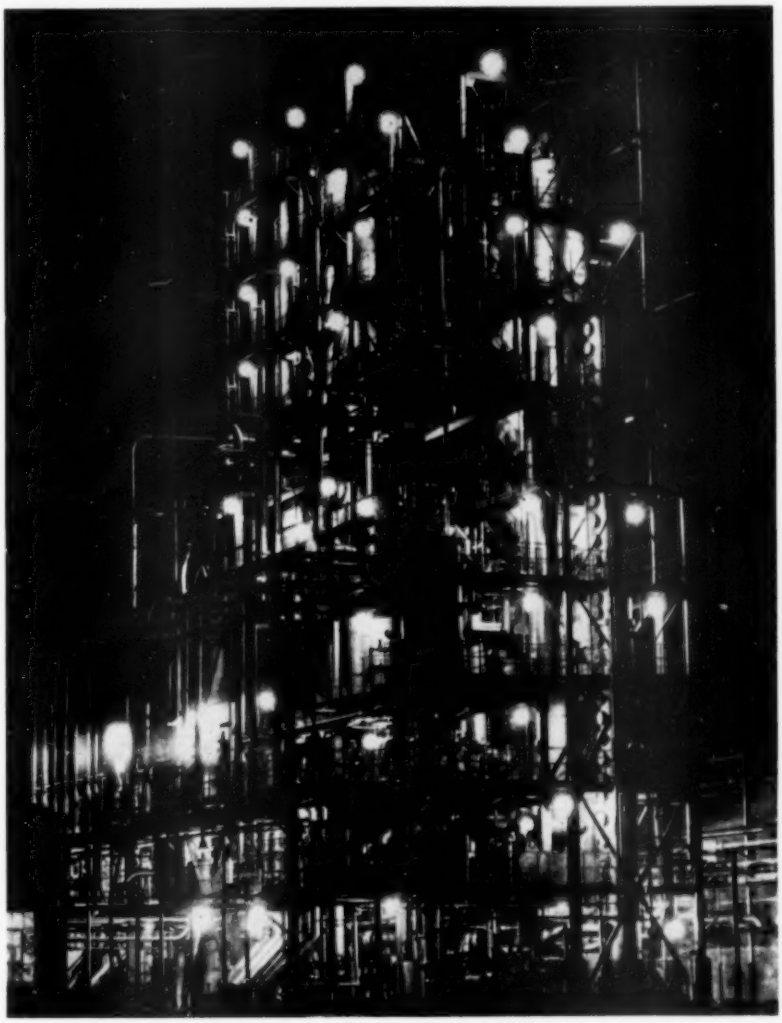
THIS WEEK... ...IN THE NEWS



LIGHTS OF NEW SHELL REFINERY at Ellesmere Port, Cheshire, England, are attracting large numbers of evening viewers, mostly residents of Cheshire and surrounding areas. This spectacular shot is of the new distillation unit. The Stanlow plant, on the Manchester ship canal, will boast the United Kingdom's first Platformer when construction is completed within the next 2 weeks. Also under construction at the plant is the world's first hydrodesulfurization unit, which will go on stream next year.

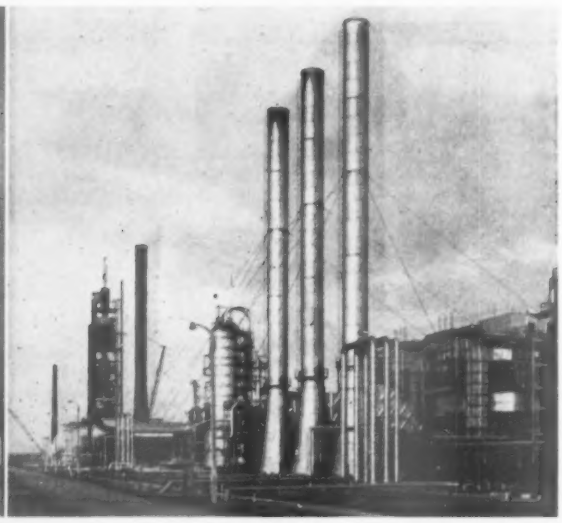
INTERNATIONAL—First shipment of crude from Saudi Arabia-Kuwait neutral zone to begin early in January, with first tanker scheduled to deliver oil to broker in Japan. . . . Industry reports are that Pacific Western's share will be refined by Tide Water on West Coast, but company declines to disclose plans. . . . ¶Rank wildcat in Abu Dhabi shaikhdom on Arabian Peninsula tests high-gravity oil. . . . Saturation also found in Aramco well between Uthmaniyah and Ain Haradh fields of Saudi Arabia, indicating possible production through 30-mile stretch between these productive areas. . . . ¶Top executives of principal international companies, including Jersey Standard, Socony-Vacuum, Texas, California Standard, and Gulf, meet in London to discuss problems which will arise when Iranian production again is put on world market. . . .

PIPE LINES—Committee representing 12 Williston basin producers designates Shell Pipe Line to draw up design and engineering plans for pipe-line outlet for basin crude. . . . Shell is to submit recommendation early next spring. . . . ¶Interprovincial Pipe Line Co. announces plans to lay 600 miles of 24 and 26-in. loops along its system between Edmonton, Alta., and Superior, Wis., and to add nine new pump stations between Regina, Sask., and Sarnia, Ont. . . . Construction will raise capacity of the world's longest continuous crude-oil main line to 200,000 bbl. daily. . . . ¶Platte Pipe Line Co. increasing capacity of 940-mile crude system from existing 110,000 bbl. to 145,000 bbl. daily with new pump stations at Holdrege, Neb., and Gower, Mo. . . .

INDUSTRY—Reopening of Carthage Hydrocol plant, even if Stanolind takes it over, will be "many months" in the future, Stanolind President E. F. Bullard says. . . . Company lets contract to Lummus for help in evaluating present Carthage Hydrocol facilities. . . . ¶Bureau of Mines sets 1954 demand at an average of 8,030,000 bbl. daily, a gain of 4.6 per cent over 1953. . . . Biggest gain expected in distillate fuel. . . . ¶Shell prepares to complete South Dakota's first commercial producer, its 1-A State. . . . Well, 75 miles south of North Dakota production, swabbed 172 bbl. on 17-hour test and will be put on pump. . . .

TRENDS—Refinery runs for the 8-week period ended December 12 averaged only 14,000 bbl. daily more than for same period last year. . . . Major product inventories are now 44,766,000 bbl. greater than a year ago compared with a difference of 32,497,000 bbl. 8 weeks ago. . . . Lower demands are indicated by this relative increase of 12,269,000 bbl. in stocks from a total gain in runs of only about 784,000 bbl. for the 8-week period. . . .

ACTIVITY—Production of crude and lease condensate averaged 6,246,250 bbl. daily for week ended December 12, up 47,625 bbl. daily. . . . ¶Total well completions reached a new high with 1,106 wells for the week. . . . ¶Wildcat completions decreased 7 wells to 215. . . . ¶Rotary rigs operating in U. S. increased 34 rigs during the week ended December 14 to 2,920, highest since December 1951.



NEW PROCESS UNITS like the cat cracker at Esso Standard's Fawley refinery at the left, new additions to the Coryton plant of Vacuum Oil Co., Ltd., on the right, have aided in the refining expansion of Western Europe during the past 3 years. The newest additions to the Coryton plant include a T.C.C. cat cracking unit and a 20,000-bbl. daily crude distillation unit.

Refinery Growth Leveling Off

Three years of European building increase crude capacity 44 per cent, boost cat cracking capacity by 340 per cent

George Weber

SUBSTANTIAL gains in rated capacity of western Europe's refineries, due in some degree to the pressure of emergency during the past 3 years, appear to be leveling off.

Free Europe's refining potential should show some gradual increase as new facilities still under construction are commissioned, but this will be offset to some extent by deferred retirement of marginal capacity as the supply situation eases.

The best available figures on existing capacity may reflect some inflation. On the other hand, rated capacities of new units recently completed or yet to be commissioned, may prove to be conservative.

Table 1 shows the trend in recent years in Free Europe's refining capacity. A breakdown by country for the end of next year is shown in Table 2. The figures are based in most cases on estimates compiled by the Organization of Oil Refinery Expansion. These figures, excluding Turkey and adding Spain and Yugoslavia, have been converted to a barrels-per-stream-day basis with a few minor adjustments reflecting the findings of some companies and individuals who have first-hand knowledge of European refining.

These capacity ratings reflect the fullest practicable processing ability of units while on stream. On the B.P.S.D. basis, the totals do not reflect downtime for necessary maintenance, which will average about 35 to 45 days a year. They also assume for the most part, a continuing demand for all products at present conversion levels, with adequate storage available for full production.

With some qualifications, they indicate the new level which European refining is reaching. Not only has basic crude capacity increased substantially, but the incorporation of many modern auxiliary facilities for catalytic cracking, catalytic reforming, treating and lube manufacture has significantly improved the efficiency and flexibility of the industry as a whole.

This is the first of many informative articles which appear in this week's issue, the Journal's annual International Number. Included is a country-by-country appraisal of the petroleum situation today throughout the world. This special section begins on page 117.

Abadan closing . . . When Abadan closed in 1951, European refiners began operating their existing facilities at a throughput rate not previously foreseen. Crude capacity was boosted rapidly through numerous expedients. Efficient use of existing equipment and the addition of minor equipment items contributed much new capacity. Some obsolete equipment was returned to service, and employment of all marginal facilities was continued. In addition, a great many thermal cracking units were converted to crude distillation service, particularly in France, Italy, and the United Kingdom.

In addition, construction schedules on many new refinery projects were greatly stepped up, and Europe's new planned capacity came on stream earlier than originally planned. These events brought about some rather drastic upward revisions in European refining capacity for the 3 years following the closing of Abadan. The figures show a 3-year gain over the end of 1951 of 44 per cent in crude capacity, 340 per cent in catalytic cracking and 61 per cent in lubricating oil manufacture.

Leveling off . . . Beyond 1954 the rapid gains in basic crude capacity will in

all probability level off, since the industry is now adequately equipped to meet internal demands. Some refineries in Italy, France, United Kingdom, The Netherlands and Belgium will continue to process for export. In long-range projections, however, the potential demand for exported products must be modified in view of the construction of refineries in Aden, India, Australia, and other points east of Suez.

Thermal cracking capacity at the end of this year, 4.1 per cent of crude capacity, remains low compared with 26.8 per cent in the United States. There are three reasons for this.

Basically, European markets require a lower ratio of distillate fuels to heavy fuels, hence such operations as visbreaking and coking do not receive the attention they do in this country. In addition, much thermal cracking capacity which was destroyed during the war has been replaced by more modern catalytic cracking capacity, and the net plant expansion over prewar levels has shown the same trend toward catalytic operations. Also, as noted, much thermal cracking capacity was converted to crude distillation service, and it is possible that much of it may never revert to its original use.

Cat cracking increases . . . European refiners have made great strides in installing catalytic cracking capacity, raising the percentage of such capacity based on crude, from 4.6 per cent in 1951 to the present 12.8 per cent. Even so, the balance of catalytic cracking does not yet approach the 34 per cent operated by United States refiners. Although the ratio of catalytic cracking to crude capacity will continue to rise in Europe, it is expected to level off at a much lower average than that of the United States which is still climbing. This again, is due to the different nature of the European fuel market. The high demand for middle distillate burning oils is not present in Europe, and no incentive exists for converting heavy vacuum distillates to that fraction.

Although motor fuel octanes are rising in Europe, they are still well below those of the United States and the need for adding substantial new capacity for high conversion operation does not exist. No large scale plans for aviation gasoline manufacture are under way in Europe in spite of some current shortages.

Lube capacity . . . By the end of 1954 Free Europe's lube capacity will equal estimated domestic consumption. A large number of modern lube plants coming on stream this year and next should reduce Europe's net imports of conventional lubricants to a negligible figure.

Although some specialty products will still be required from this country it is probable that an excess capacity for automotive crankcase oils and other basic lubricants will promote some exportation from Europe. The net result should be a balance in trade of all lubricants.

This factor is largely responsible for the dwindling export market for United States lubes which dropped from an average of 42,200 bbl. per day last year to 32,400 bbl. per day during the first 9 months of this year. In addition to having lost most of the European market it is likely that United States lube manufacture will encounter increasing competition in other markets from European refiners.

It will be noted that projected lubricant capacity expressed in production is considerably higher than reflected in some other surveys of Free Europe. In solvent extraction plants which represent a major part of European capacity, potential production can vary 40 per cent or more with the degree of refining and the solvent-oil ratios employed. Blocked-out operations of some units for wax manufacture can further alter plant capacity for oil output. The figures listed here, based on OEEC estimates are understood to represent operations for maximum production.

TABLE 1—REFINING CAPACITY IN WESTERN EUROPE
(1,000 bbl. per stream day)

	Year end			
	1951	1952	1953	1954
Crude	1,626	1,847	2,202	2,341
Reforming	158	190	230	252
Per cent crude	9.7	10.3	10.4	10.8
Cracking:				
Thermal	73	98	107	96
Per cent crude	4.5	5.3	4.9	4.1
Catalytic	75	146	282	333
Per cent crude	4.6	7.9	12.8	14.2
Total cracking and reforming	306	434	619	681
Per cent crude	18.8	23.5	28.2	29.1
Lubricants	35.6	37.7	50.7	57.4
Per cent crude	2.2	2.0	2.3	2.5

TABLE 2—ESTIMATED EUROPEAN REFINING CAPACITY
(Barrels per stream day as of December 31, 1954)

Country—	No. plants	Crude	Reforming	Thermal cracking	Catalytic cracking	Lubricants
Belgium	7	121.7	9.6	1.2	26.7	0.3
France	13	560.8	84.3	11.5	57.1	14.6
Germany	21	242.2	29.0	24.3	58.3	12.3
Italy	32	395.2	58.7	11.8	33.2	7.3
Netherlands	2	222.2	17.3	28.6	28.9	0.9
Spain*	2	57.7	5.0	11.9		
Sweden	2	41.4	7.2	1.0		0.6
United Kingdom	15	646.8	40.1	2.5	117.9	21.0
Others†	4	53.4	1.0	2.7	10.4	0.4
Total	98	2,341.4	252.2	95.5	332.5	57.4

*Including Canary Islands. †Including Denmark, Norway, Portugal, Switzerland, and Yugoslavia.

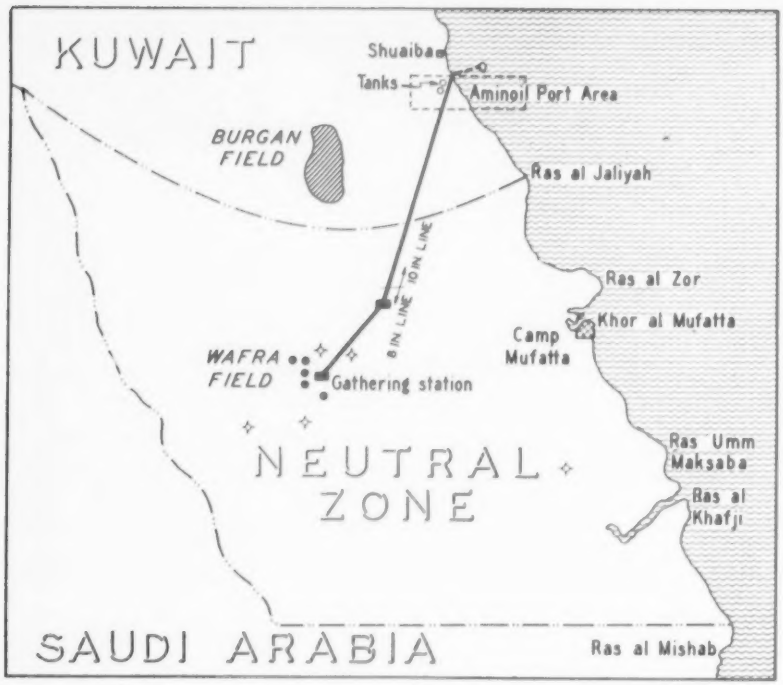
Japan Buys Wafra Oil

First tanker load will leave Neutral Zone terminal early in January; Tide Water expected to handle part of output

THE first 100,000 bbl. of Neutral Zone crude will go to Japan.

American Independent Oil Co., operator of Middle East concession, revealed last week that the first crude from the rapidly expanding field has been sold to Asano Busan, Japanese crude and products brokers. No details of price or currency involved were disclosed.

The tanker load of crude, due for lifting January 5 at the newly completed terminal on the Persian Gulf, is destined for Daikyo Oil Co.'s 14,000-bbl. refinery at Yokkaichi, midway between Tokyo and Osaka.



Commitments for the crude beyond the first tanker load are still in the negotiating stage, Aminoil officials said. Pacific Western Oil Co., owner of half of Wafra field's oil, declined to reveal plans for its share of the crude.

The two companies will alternate liftings at the terminal. The first Pacific Western lifting is tentatively scheduled for mid-January.

Tide Water refining? . . . While Pacific Western plans were undisclosed, industry sources believe its share of the crude will ultimately be taken by Tide Water Associated Oil Co. for processing in refineries on the West Coast of the United States. Controlling interest in Tide Water is owned by Pacific Western and Mission Development Co., both J. Paul Getty enterprises.

Tide Water has two refineries on the West Coast — the 88,000-bbl. daily Avon refinery at Associated, Calif., and the 15,000-bbl. daily Watson refinery at Wilmington. The Wafra field crude is relatively heavy 24.5°-gravity sour crude.

Quick development . . . Completion of the pipe line and terminal facilities to serve Wafra field and the arrival of a second rig are expected to expand the entire operation rapidly.

Ralph K. Davies, president of Aminoil, said plans call for expanding the transportation and shipping facilities to keep pace with increasing production as development drilling proceeds. Additional tankage is now on order.

Davies said the construction program, initiated in July, was completed in record time. He hailed the first shipment of oil from the Neutral Zone as "a milestone in the history of independent oil enterprise abroad."

Present facilities at the field gathering center provide two Rolo single-stage separators, 55,000 bbl. of production tankage and pumping equipment necessary to move crude to the terminal at a maximum rate of 20,000 bbl. daily. A 34-mile, 8 and 10-in. line links the gathering center and the terminal.

The terminal is located in Kuwait immediately south of the terminal of Kuwait Oil Co., Ltd., at Mena al Ahmadi. The Aminoil port, chosen after extensive coastal and hydrographic surveys, has been named Mena Abdulla in honor of the present ruler of Kuwait.

Facilities . . . Terminal facilities include two 73,000-bbl. cone-roof tanks, three centrifugal shipping pumps and approximately 9,500 ft. of 16-in. submarine line. One loading berth is available at the seaward end in about 48 ft. of water. Loading rate will be approximately 7,500 bbl. an hour.

Aminoil will handle Pacific Western's share of the oil at its terminal.

Wafra field's five present wells are shut in pending final completion of the shipping facilities. A second rig is now in operation in the field and Aminoil expects to complete additional wells at the rate of one every 3 weeks with the two rigs running. Present drilling plans call for 1-mile stepouts to define the limits of the field.

Trucial Test Produces

Crude of 43° gravity unofficially reported after drill-stem tests on Iraq Petroleum well on Arabian Peninsula

LIGHT crude has been tested by the Iraq Petroleum Co., Ltd., organization in a wildcat well on the Trucial Coast in the eastern part of the Arabian Peninsula.

Unofficial reports in the industry were that crude of around 43° gravity was obtained in a drill-stem test in the Murban well in the shaikhdom of Abu Dhabi. The well is drilling ahead below 10,000 ft. and full significance of the apparent discovery awaits further testing and evaluation.

Another report of successful exploratory work in the Middle East has come from Arabian American Oil Co.'s operations in Saudi Arabia. The company's Huiya 1 well about half way between the south end of Uthmaniyah and Ain Haradh obtained saturation in coring at a depth of about 6,100 ft.

Importance . . . The importance of the Huiya well lies in the fact that it indicates possible oil production in the stretch of approximately 30 miles between the 1949 discovery at Haiadh and the Greater Ghawar field of which Uthmaniyah is a part. These areas are all located on the north-south regional feature known as the En Nala anticline.

The Trucial Coast concessions are held by an I.P.C.-associated company, Petroleum Development (Trucial Coast) Ltd. If commercial production is eventually established in this area, it would represent a further southeastward extension of the fields now extending along the west side of the Persian Gulf from Zubair in southern Iraq to Dukhan in Qatar.

The Murban well is located about in the middle of Abu Dhabi at approximately 23° 50' north Lat. and 53° 45' east Long. It is the third exploratory effort for the company on the Trucial Coast. In 1950-51, Ras Sedr was abandoned dry in Abu Dhabi at 13,001 ft. and in 1951 another dry hole, the Jebel Ali test, was drilled to 12,352 ft. in the adjoining shaikhdom of Dubai. All these wells have been on seismic domes.

Ras Sedr was finished in upper Jurassic, and Jebel Ali, in upper Cretaceous after penetrating some 4,000 ft. of salt in the Miocene lower Fars.

Offshore rights . . . Southern boundaries of these territories are largely undefined and in dispute with Saudi Arabia. While the I.P.C. group has the onshore and territory waters under concession from agreements dating back before the war, Anglo-Iranian early this year acquired rights for "continental shelf" exploration in the Persian Gulf from Abu Dhabi. A similar "continental shelf" concession from Dubai was taken jointly by A.I.O.C. and the Cie. Francaise des Petroles.

The Huiya well, though classified as a stepout by Aramco, is about 15 miles south of the presently established limit of Uthmaniyah. Structurally, the well is as high as Ain Haradh and about 300 ft. above Uthmaniyah. Geologists familiar with the area believe there will undoubtedly be some breaks in this southern section. Present indications are that productivity becomes somewhat less, gravity drops off slightly, and formations run higher as the area extends to the south.

Fields connected . . . Development drilling by Aramco during the last 2 years has connected the former three separate fields of Uthmaniyah, Ain Dar, and Shedgum into what is now known as Ghawar. This tremendous oil reservoir is now considered by many to be the world's largest. It accounts for the bulk of Saudi Arabian reserves unofficially estimated at 28,000,000,000 bbl. and even higher by other competent engineers.

Another Aramco exploratory development of interest was the spudding December 13 of the first well to be drilled in the Rub al Khali, the great desert area of southeastern Saudi Arabia whose name in Arabic means "The Empty Quarter." Aramco has been doing geophysical work in this area for several years. The test, for which Aramco has moved in a National 100 rig, is roughly 200 miles south of Uthmaniyah at approximately 25° 30' north Lat. and 51° east Long.

Iran Dispute Analyzed

Walter Levy outlines six basic considerations involved in any settlement of the oil nationalization controversy

SIX basic considerations voiced in the past and equally valid today in any settlement of the Iranian oil dispute were outlined last week by Walter Levy, New York consultant on petroleum economics.

Levy, who was adviser to W. Averill Harriman during his mission to Iran in August 1951 has held several important government oil posts. He said the prime principle involved in any settlement is that international law requires prompt, adequate and effective compensation and pointed out that mere willingness to pay without the ability to do so is obviously insufficient.

Points involved . . . The other considerations are:

Nationalization of a foreign investment without management, technical and commercial competence will not only destroy the enterprise but may also lead to economic and political collapse of the country.

The owner of the nationalized properties would be prepared to help only on the basis of an agreement and satisfactory compensation.

In any case, the investor could not afford to jeopardize his position in other countries where he may have interests not expropriated.

None of the large integrated oil companies in the international field could be expected to assist in any settlement in Iran that would "demonstrably penalize those producing countries which have faithfully observed their contractual and concession agreements."

Each oil-importing company or country is vitally interested in continued availability of adequate supplies, and hence, could not afford to tie himself to an oil supplier in whose technical or managerial competence he would not have complete confidence over the long term.

Levy, whose discussion was presented at a round-table conference sponsored by the Middle East Institute in Washington, gave several reasons why American companies do not represent the most logical customers for renewed exports of Iranian oil. Since the Iranian nationalization, American companies, as compared to British and other European interests, have been long on Middle East production and reserves in relation to their imports of crude and products into Europe and their share of European refining capacity.

Balance of interests . . . American interests, Levy remarked, control currently more than 60 per cent of Middle East production and proved reserves (excluding Iran) as compared with about 45 per cent early in 1951. Their share in European imports of crude and products amounts to some 37 per cent and in European refining capacity to only 25 per cent. On the other hand, British and other European interests now own only some 40 per cent of present Middle East production and proved reserves as compared with about 55 per cent in early 1951. Their present market share of European imports is, however, 63 per cent and in refining capacity, 75 per cent.

Levy said that even if American companies would purchase Iranian oil at a price that would be no higher than that at which they could obtain or develop oil elsewhere, the purchases might still be commercially disadvantageous because of tax considerations, compensation obligations to the former owner, and other reasons. Furthermore, to the extent that they would result in a conversion of soft-currency oil into dollar oil, such purchase by American companies might raise problems for importing soft-currency countries. Other problems could arise in connection with the level of production in American-held concessions, and the possibility of serious legal complications in the United States.

"If and when Iranian oil exports should be resumed on a substantial scale, they would, in the first instance, probably replace the purchases which British and other companies have made in the Western Hemisphere and from American companies elsewhere. They would affect the expanded rate of British production in areas such as Kuwait, and they would affect American-owned production somewhat, as a result largely of the reduction of sales by American companies to British and other customers," he said.

Operation before compensation . . . Levy expressed his belief that an agreement on the resumption of industry operations in Iran must come before an agreement on compensation. A satisfactory agreement on the determination of compensation or even on the actual amount would be meaningless and ineffective if subsequently the oil operations were not to be resumed, since Iran would obviously be unable to fulfill her obligations, he said. The proposals that dealt with the compensation issue first, such as the Churchill-Truman proposal of August 1952, were only presented because it was considered hopeless to achieve any immediate agreement on practical oil operations with the Mossadegh Government.

Discussing the specific oil problems involved in a settlement, Levy pointed

out that there is now an immediate surplus crude productive capacity of more than 1,500,000 bbl. daily. The Iranians, ever since nationalization, have been warned of this development. It is generally assumed resumption of operations in Iran would require other producing countries and companies to reduce output, or at least abstain from expanding it. Levy said, however, that in the Eastern Hemisphere—the natural outlet for Iranian oil—requirements increase annually by some 250,000 to 300,000 bbl. daily.

Loss estimated . . . The nationalization of Iran has caused a tremendous loss, not only to Iran but also to Britain. Levy said the Iranian Government's loss in revenue was at least $450,000,000 in government income and probably considerably more than $600,000,000 in foreign exchange income, assuming normal development of the industry.

"These are losses which can never be fully recouped," he said. The cost to Britain of replacing Iranian supplies was at a peak dollar expenditure at an annual rate of $500,000,000 in September 1951. This has been progressively reduced, declining to an estimated $200,000,000 in 1952 and probably one-half to two-thirds of that amount in 1953. These figures, Levy said, exclude dollars required for increased capital expenditures for the development of replacement oil production and refining facilities.

Levy recalled that the Iranian National Oil Co. has estimated some $30,000,000 to $40,000,000 will be needed to establish operations at Abadan and 600 foreign technicians would be required. This, however, is a low estimate, he said. It is more likely that to resume operations at full capacity, between $125,00,000 and $150,000,000 including working capital must be found.

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TECHNOLOGY

Fractionating Answers

Latest information bearing on design of tower components outlined before annual A.I.Ch.E. meeting in St. Louis

ST. LOUIS.—How can design and performance of fractionating equipment be improved? What actually goes on inside a fractionating column?

New information leading toward some answers to these questions was presented here last week in several heavily attended sessions of the annual meeting of the American Institute of Chemical Engineers.

Highlights of these sessions included:

. . . A new correlation for bubble-cap tray design.

. . . Presentation of data on the newly developed Shell Oil Co. turbogrid trays.

. . . A comparison of bubble-cap trays with sieve trays.

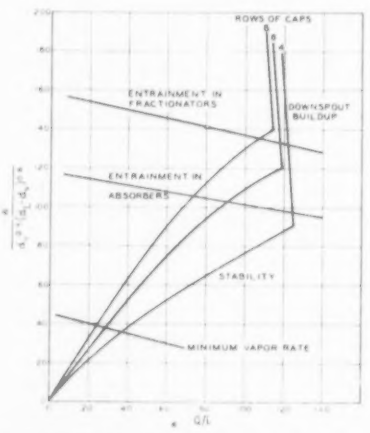
. . . New information on entrainment and plate efficiency.

. . . Discussion of the effect of load and pressure on commercial bubble-cap column performance.

. . . Outline of results of fundamental studies on bubble formation.

Design of fractionating towers has become highly competitive in recent years, three M. W. Kellogg Co. engineers told the society. Designers are faced with the problem of designing trays with higher vapor and liquid loadings than ever before.

In both the petroleum and chemical industries, they said, better fractionation is required to produce purer chemicals and better grades of petroleum products. In order to obtain better fractionation with more heavily loaded bubble-cap trays, several companies have begun programs to study bubble-cap hydraulics and other factors which affect fractionation, they said.



CORRELATION CHART for design of a bubble-cap tray. Vapor rate (W) in pounds of vapor per cap per hour divided by a function of vapor and liquid density is plotted as ordinate against liquid rate in gallons per minute per foot of weir (Q/L) as abscissa. This particular chart is for a cap diameter of 4 in., cap spacing up to 2 in., and 4.6 caps per square foot.

Correlation charts . . . Paul Munk, of California Research Corp., presented a series of charts from which complete tray design information can be obtained, including tray diameter, weir length, cap size and spacing, number of caps, and number of cap rows. Munk's charts are for round caps 3 to 6 in. in diameter with spacing between caps of 1.5 to 2.5 in.

The accompanying figure, for example, can be used for design of new trays or modification of existing trays either to obtain better performance or prepare them for some new service.

The correlations have been used, Munk said, to determine diameter and tray layout for new absorber columns, for modification of a hydrogen sulfide stripper and of an existing absorber, and in the analysis of the operation of a stabilizer which resulted in changes leading to increased column capacity.

"Of the many design methods available," Munk stated, "only a few take into account the interdependence of vapor and liquid flow. Most treat vapor and liquid flows separately and then try to compensate for the effect of one or the other."

Munk's correlation shows relative effect of vapor and liquid flows as well as physical characteristics of the tray. The variables considered in preparation of the charts are:

. . . Vapor flow as limited by the entrainment and the contacting efficiency.

. . . Liquid flow as limited by the down-spout capacity.

. . . The relative effect of vapor and liquid flow rates on the stability of tray operation and on vapor distribution.

. . . Bubble cap size and cap spacing.

Regions of satisfactory operation are incorporated in these charts. The limits defining such a region are therefore

entrainment of liquid in vapor, downspout capacity, tray stability, and minimum vapor rate.

"In the present method," Munk continued, "the cap is considered the limiting factor in handling the vapor load. In most methods, the total tower cross-section has been used to determine vapor loading. This disregards the effect of slot velocity on entrainment. Motion pictures of tray operations indicate that the entrainment depends on the slot velocity as well as on the superficial velocity."

To establish a maximum allowable slot velocity, the correlation of T. C. Dauphine was used. Dauphine's work was also employed in developing equations for pressure drop through the bubble caps.

Turbogrid . . . R. B. Olney described Shell Development Co.'s turbogrid distillation trays, which are constructed in two general types, the bore and stamped-slot types. The trays consist of a flat grid of parallel slots, the grid extending over the entire cross-sectional area of a column except for the area blocked by support structure.

The number of theoretical trays per foot of column height is about the same as in conventional designs, even though the column with turbogrid is operated at higher throughput.

In normal operation, the parallel slots in the trays serve as passages for both liquid and vapor flow through the tray. Flow of both liquid and vapor occurs as a cycling, or intermittent, jet action, uniformly distributed with respect to both phase flows over the entire grid pattern.

Twelve examples of turbogrid tray installations in plant service were noted out of some 50-odd grid towers now in service.

Examples in hydrocarbon service included a tower operating on full-boiling-range straight-run gasoline and prefractionated straight-run gasoline bottoms, a column used to fractionate a feed consisting of C_6's and C_7's, the stripping section of a depropanizer, and debutanization service. Examples in petrochemical operations include a column used for stripping alcohols from fat, hydrolyzing acid with steam, removal of benzene as an impurity in a hydrogen stream, and in scrubbing sulfur dioxide from a propane-propylene stream.

In general, turbogrid trays are said to provide high capacity, low pressure drop, low liquid holdup, and low cost relative to conventional designs.

Shell is currently extending its use of turbogrids in essentially all current plant expansions. Among these are all columns in the new 16,000-bbl. Platformer installation at Houston. A new gas absorption plant, ammonia plant and essentially all columns in the major expansion of the Norco refinery.

Sieve plates . . . These have been known to be cheaper than bubble-cap plates but have certain inherent disadvantages:

. . . They are limited in plate thickness by existing punching techniques.

. . . There is a tendency toward leakage, particularly at low liquid rates when excessive dumping may occur.

J. B. Jones and C. Pyle of E. I. Du Pont de Nemours & Co., compared relative performance of sieve and bubble-cap plates at approximately the same pressure drop for plate efficiency and entrainment.

Sieve-plate performance was equal or superior to that of the bubble-cap plates. A cost comparison for 72-in. diameter plates showed sieve-plate cost, on a square-foot basis, to be about half that of bubble-cap plates.

Basic data . . . M. W. Kellogg researchers presented a portion of data obtained in the Kellogg study of rectangular bubble-cap hydraulics and factors affecting entrainment. They found, for an air-water system, that decreasing the liquid path length increased the entrainment from a bubble-cap tray, while increasing tray bubbling area decreased entrainment.

H. A. Clay, T. Hutson, and L. D. Kleiss of Phillips Petroleum Co., reported on experimental study of design factors on a 3-ft. diameter, 50-tray column using the isobutane-normal butane system. They found that liquid load had little effect on the vapor-handling capacity of the column. Optimum operating pressures were calculated from the experimental data.

Effect of length of liquid path on plate efficiency was reported by M. F. Gautreaux and H. E. O'Connell of Ethyl Corp.

Kirkbride Heads A.I.Ch.E.

ST. LOUIS.—Chalmer G. Kirkbride, president of Houdry Process Corp., Philadelphia, has been elected 1954 president of the American Institute of Chemical Engineers.

KIRKBRIDE

Announcement of Kirkbride's selection was made here last week at the forty-sixth annual meeting of the technical society.

Barnett F. Dodge, head of the chemical engineering department at Yale University, was elected vice president, and George Granger, of the University of Michigan, was named treasurer. Stephen L. Tyler was reelected secretary.

Reindeer Bow to Traffic Safety

Santa Claus and his reindeer will not be mounted on these bobbing pumping wells at Huntington Beach as they have in past years. Because of the huge crowds they attracted, with consequent traffic jams on Pacific Coast Highway, Southwest Development Co. this year was asked by the Highway Department not to put up the display. Though closely grouped at the surface drill site, the bottoms of these wells are widely spaced underneath the Pacific Ocean.

CLIFFS OF OIL SHALE overlook this entire valley near Rifle, Colo.

Will We Mine Oil?

Sen. Malone's committee will probably recommend building pilot plant for production of liquid fuels from oil shale

Bertram F. Linz

CONGRESS may be asked next year to embark the government on a new adventure in synthetic liquid fuels.

A recommendation to that effect is seen probable in the report to be made some weeks hence by Sen. George W. Malone of Nevada, chairman of a Senate interior subcommittee which has been studying Western Hemisphere wartime self-sufficiency in fuels, minerals and metals.

There is, however, no indication that an operation the size of the recently terminated Interior Department $80,000,000 program for coal hydrogenation will be proposed. Most likely to be suggested is the building of an oversized pilot plant for the production of liquid fuels from oil shale.

The idea of such a project was laid before the subcommittee by A. C. Rubel, vice president of Union Oil Co., who estimated that a plant to produce 1,000 to 1,500 bbl. daily could be constructed at a cost between $5,000,000 and $7,500,000.

Purpose . . . The purpose of the plant would be to provide the know-how for quick development of a big synthetic fuels industry if needed in time of war, much along the lines followed by the military in financing the design and construction of experimental airplanes and other major equipment.

Like other western senators, Malone is greatly disturbed over our increasing imports of metals and minerals which he charges have forced the closing of many domestic mines. He sees similar danger to the domestic oil industry in imports of petroleum, hence his interest in synthetic fuels.

That interest was evident at the very outset of recent hearings on oil supply. Taking the position that during a war we could not produce enough oil in this country to meet our needs and those of our allies and would lose much of our foreign supply—Malone asked his first witness, Interior Secretary McKay, whether he would favor an immediate start on development of a shale-oil industry.

Question of policy . . . McKay told the senator the question is one of policy to be decided by Congress but indicated that if the experts in the Bureau of Mines agreed it was feasible he saw no particularly objection to a moderate program.

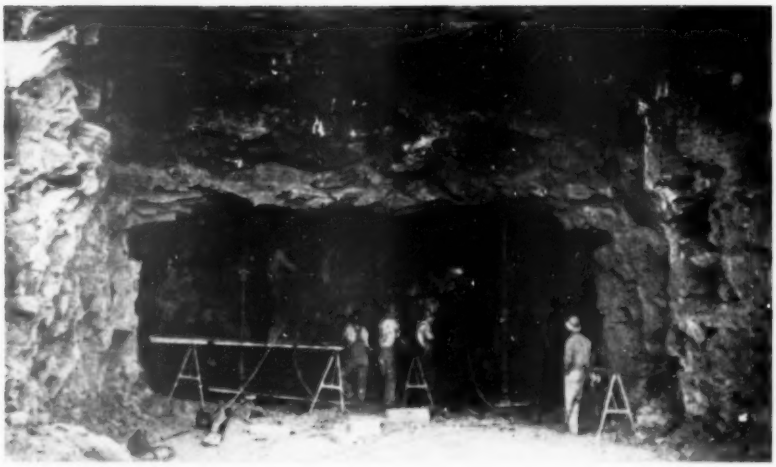
If Malone presses for construction of a prototype plant he may suggest that before the government undertakes the project the oil industry be given an opportunity to build it, either alone or in partnership with the government.

Since the plant would require a considerable investment and would have to operate at a loss because of high unit cost, the industry might be no more receptive to the idea at this time than it has been to the proposal for construction of a super-inch defense pipe line from the Gulf to the East Coast. That would leave it up to the government to finance the plant and then either have it operated or placed in stand-by status until needed.

Union holdings . . . In presenting the idea to the subcommittee, Rubel explained that Union Oil itself has long been interested in synthetic fuels. The company holds approximately 40,000 acres of shale land, some of it acquired 30 years ago, and for several years has been engaged in process development. It now has a 50-ton per day retort which has performed satisfactorily on sustained runs and has designed a 1,000-ton unit with which the company anticipates no difficulties in construction or operation.

A plant such as proposed, Malone was informed, would in effect provide the "stockpiling" of oil which cannot be accomplished with petroleum. And by being ready when synthetic fuels may be needed, the government could avoid the mistakes and waste experienced during World War II in the development of the synthetic rubber industry.

Rubel emphasized that synthetic fuel



OIL SHALE IS TOUGH, hard to drill and difficult to break with explosives and that is one factor involved in the high unit costs involved. Here drill holes are sunk before blasting in a Bureau of Mines experimental shale mine near Rifle, Colo.

development has no relation to the current import situation, nor would synthetic oil at any time in the foreseeable future be more than a supplement to domestic petroleum production.

He pointed out that a plant capable of producing 50,000 bbl. daily of fuel from shale, with a pipe line to market, would cost in the neighborhood of $300,000,000 and is not justified at this time. But with the expense of finding, developing and producing petroleum rising steadily, the spread between the cost of synthetic and natural fuel will steadily narrow in coming years and eventually the economics will favor synthetic development.

Shale deposits . . . Although there are shale deposits in a number of states, the largest and most accessible are in northwestern Colorado where an area of approximately 1,000 square miles is underlain by shale 500 feet thick and averaging 15 gal. of recoverable oil per ton.

The total oil potential of the area is estimated at up to 500,000,000,000 bbl. Only the lower portion of the bed, the "Mahogany Ledge" with shale up to 100 ft. in thickness averaging 30 gal. per ton, with a potential of 100,000,000,000 bbl., is considered workable in the predictable future.

Major advantages which will lie with shale when the time for large-scale development arrives are that there will be no further finding costs, since the reserves already have been located and mapped, and it can be developed in an orderly manner as demand increases. The latter will be due to the fact that the best method of mining the shale is considered to be not one tremendous operation but a series of small mines of not more than 20,000 tons production a day.

Technical problems . . . The big problems in retorting the shale are the supply of water required and the disposition of the spent shale. There have been reports of the development of new methods minimizing the use of water.

Because of high viscosity and high pour point, shale oil as such is difficult and expensive to transport. It is contemplated it would be cracked with heat at plants at the source of production and treated with hydrogen to remove impurities and improve quality before being shipped to refineries for further processing into products. Transportation could be by pipe line once production reached the 40,000 bbl. per day estimated as necessary to make a line profitable.

To get a 40,000 bbl. daily output it would be necessary to operate four mines, producing 78,600 tons of shale daily from which 17,340 bbl. of unfinished gasoline and 23,640 bbl. of unfinished gas oil would be secured together with 24,830 M.c.f. of excess fuel gas, 1,180 tons of coke, 92 tons of ammonia and 43 tons of sulfur. From the unfinished gasoline and gas oil, refiners could produce 12,690 bbl. per day each of premium and regular gasoline, 12,200 bbl. of diesel fuel, 340 bbl. of fuel oil and 1,780 bbl. of liquefied petroleum gases.

Socony Files Counter Suit

PHILADELPHIA.—Socony-Vacuum Oil Co. has asked a federal court here to restrain Houdry Process Corp. from "unlawful interference with Socony-Vacuum's business."

The oil company complains that Houdry lawyers have warned 11 firms licensed by Socony to use the new T.C.C. cat cracking process and 15 others who are prospective licensees that Houdry will hold them liable for patent infringement for using the process.

Last February Houdry sued Socony for patent infringement charging Houdry "know how" is used in the new cat cracking process developed by Socony. That suit asking $20 million in damages is still pending.

Oil Origin Debated

A.C.S. section hears new continuous sediment theory

ALL the many theories on where petroleum comes from—plus a new one—were reviewed at the December meeting of the American Chemical Society's New York Section. The review was marked by differences of opinion which characterize all discussions on this subject.

Theodore W. Nelson, director of research and development of the Socony-Vacuum Laboratories, Paulsboro, noted that theories for the origin of oil are many and conflicting. It can be reasonably concluded, he said, that petroleum is of organic origin, derived from both terrestrial and marine organic matter, and it is formed at temperatures lower than 200° C.

Mainly involved is a conversion of organic matter by physical and chemical factors, perhaps aided appreciably in the early stages by bacterial action.

Since no one has traced the steps from organic residues in recent sediments to the first appearance of a liquid mixture with the chemical and physical properties of crude oil, Nelson summarized that the duration of the process is unknown. It may be more significant than we realize, he said, that the youngest known accumulation of oil is found in rocks of Pliocene age, 1 million years old.

New theory . . . The belief that oil may be forming continuously in sediment laid down by rivers, lakes and the sea was advanced by Dr. Paul V. Smith of Standard Oil Development Co., Linden, N. J.

Smith cited studies of offshore sediments which may contain 10 million barrels of petroleum-like hydrocarbons. His theory of continuous formation of petroleum runs counter to the generally accepted view that crude oil results from the burial of organic matter at great depths for millions of years. The hydrocarbons which he believes may be embryo crude oil, have been extracted in small quantities from recent sediments. His theory holds that if any great length of time is involved in the formation of petroleum, it is

the time required for the migration of these traces of hydrocarbons into porous geologic traps.

Hydrocol Study Slow

Plant may not open for a year "if" Stanolind gets it

TULSA.—It may be a year or more before the Carthage Hydrocol, Inc., gas-synthesis plant at Brownsville, Tex., resumes operation—if it does.

E. F. Bullard, president of Stanolind Oil & Gas Co., which has an option to acquire the plant in an unusual procedure, last week said "several months" will be required to study the physical condition of the shut-down plant to determine whether Stanolind wishes to take it over.

"If we should decide to acquire the property, another period of many months would be necessary before operations could be resumed," Bullard said.

The Stanolind president disclosed that Lummus Co. has been contracted to help conduct investigations of the physical condition of the huge synthesis plant. Lummus engineers began arriving at Brownsville last week and will work with Stanolind personnel in the survey.

The nine owners of Carthage Hydrocol have written off their $50,000,000 investment in the Brownsville plant and turned it back to the Reconstruction Finance Corp., which holds an $18,500,000 mortgage on the facilities. Stanolind in mid-November signed an agreement with RFC which gives Stanolind an opportunity to study the plant and, if it desires, acquire it by taking over the RFC loan, now paid down to about $17,500,000 *(The Oil and Gas Journal, November 9, page 66).*

It has been estimated that a further investment of about $18,000,000 would be required to bring the plant to capacity operation—6,000 bbl. daily of gasoline, 900 bbl. of diesel oil, 200 bbl. of fuel oil, and 300,000 lb. of chemicals. The plant was designed to produce this volume of products by conversion of 90,000,000 cu. ft. of natural gas daily.

Stanolind, which owns no Carthage Hydrocol stock, is interested in the plant because of its $15,000,000 investment in an adjacent plant built to process a by-product stream from the Carthage Hydrocol plant. The Stanolind plant produced acids, alcohols, ketones, and aldehydes which it sold to U. S. Industrial Chemicals, Inc. The Stanolind plant operated on a stockpile of raw-feed material for several weeks after Carthage Hydrocol shut down but has been closed since early in August.

'54 Demand to Rise

Bureau of Mines forecast for next year predicts average of 8,030,000 bbl. per day, an increase of 4.6 per cent

DOMESTIC demand for crude and petroleum products in 1954 is expected to average 8,030,000 bbl. daily, according to the latest forecast by the Petroleum and Natural Gas Branch of the Bureau of Mines.

This total compares with 7,677,000 bbl. daily for 1953, the revised estimate by the bureau based on reduced demands indicated for October and November by weekly data.

Total domestic demand expected for 1954 represents an increase of 4.6 per cent over the average for 1953. The largest gain by products is forecast for distillate fuel, up 11.2 per cent. However, part of this large percentage gain is due to the fact the average for 1953 was low because of abnormally warm weather in the first and fourth quarters of the year.

Domestic demand for gasoline next year, as projected by the bureau, represents a gain of 5.1 per cent over 1953. Kerosine is expected to be up 6.5 per cent, but the forecast for residual calls for a decrease of 1.6 per cent.

Since a decrease is forecast for exports, the gain in total demand is held to about 3.4 per cent over 1953.

Additions to storage in 1954 are projected at about 22,000 bbl. daily compared with 126,000 bbl. daily in 1953. This difference results in a smaller needed increase in new supply than the increase in total demand.

The total new supply for next year is expected to be up 2.1 per cent. This gain includes increases of 3.6 per cent in total imports, 1.4 per cent in crude production, and 6.8 per cent in output at natural-gasoline and cycling plants.

BUREAU OF MINES FORECAST FOR 1954
SUPPLY AND DEMAND
(Thousands of barrels daily)

	First quarter	Second quarter	Third quarter	Fourth quarter	Year 1954	Estimated* 1953
Domestic demand—						
Gasoline	3,189	3,714	3,750	3,522	3,545	3,373
Kerosine	511	220	217	489	359	337
Distillate	2,111	1,110	1,000	1,848	1,515	1,362
Residual	1,778	1,417	1,337	1,641	1,542	1,567
Other	944	1,077	1,207	1,043	1,069	1,038
Total	8,533	7,538	7,511	8,543	8,030	7,677
Exports—						
Crude	33	33	32	33	33	52
Products	289	319	272	228	277	334
Total	322	352	304	261	310	386
Total demand—						
Gasoline	3,278	3,813	3,837	3,587	3,630	3,477
Kerosine	522	242	228	500	373	356
Distillate	2,189	1,198	1,076	1,902	1,589	1,446
Residual	1,833	1,472	1,381	1,685	1,592	1,633
Other	1,033	1,165	1,293	1,130	1,156	1,151
Total	8,855	7,890	7,815	8,804	8,340	8,063
Stock change—						
Crude						17
Products	—422	341	467	—304	22	109
Total	—422	341	467	—304	22	126
New supply	8,433	8,231	8,282	8,500	8,362	8,189
Imports—						
Crude	633	670	706	728	685	652
Products	500	363	326	457	411	406
Total	1,133	1,033	1,032	1,185	1,096	1,058
Production—						
Crude	6,589	6,511	6,549	6,576	6,556	6,466
Other oils	711	687	701	739	710	665
Total	7,300	7,198	7,250	7,315	7,266	7,131
Runs to stills	7,138	7,092	7,171	7,223	7,156	7,014

*Revised by the Bureau on basis of weekly data for October and November.

Demand Catching Up

Agency predicts balanced market for first quarter

LOS ANGELES. — Indications are that the West Coast will enter the coming year with a supply-demand situation in better balance than at any time since last February.

Total petroleum stocks in Bureau of Mines District 5 are continuing to increase. But where they were gaining at the rate of about 80,000 bbl. daily during the first 10 months, according to bureau reports, they currently are estimated to be increasing only about 15,000 bbl. daily.

Looking at the first quarter of 1954, the Oil Producers Agency last week estimated that imports of foreign crude would decline from their current levels to about 50,000 or 60,000 bbl. daily. This would be a reduction of 20,000 to 30,000 bbl. from the average during the first 9 months of this year.

Agency optimistic . . . A crude-production level of 995,000 bbl. daily, plus natural-gas-liquids production of 85,000 bbl. daily (the current rate), plus imports of 60,000 bbl. and receipts of 50,000 bbl. from domestic sources outside District 5 would bring total supply in the district to 1,190,000 bbl. daily during the early months of 1954. This level of supply would be approximately 1.3 per cent higher than the level prevailing during the first quarter of 1953 and approximately 40,000 bbl. higher than demand during that quarter, which was 1,150,000 bbl. daily.

However, if demand continues to increase at the 4.2 per cent rate of the first 9 months of 1953, it will total 1,198,000 bbl. daily daily during the first quarter of 1954. This would leave an indicated supply deficit of 8,000 bbl. daily.

No such deficit will exist, however, the agency report stated. If it appears that one impends and cannot be offset by stock withdrawals, the industry will augment its supply sources.

Survey Contract Signed

LONG BEACH.—Contract for making a seismic survey of Long Beach's submerged lands inside the outer harbor breakwater has been awarded Western Geophysical Co.

The project is expected to start early in January and be completed in 15 working days. According to City Manager Sam Vickers, cost will be from $75,000 to $100,000.

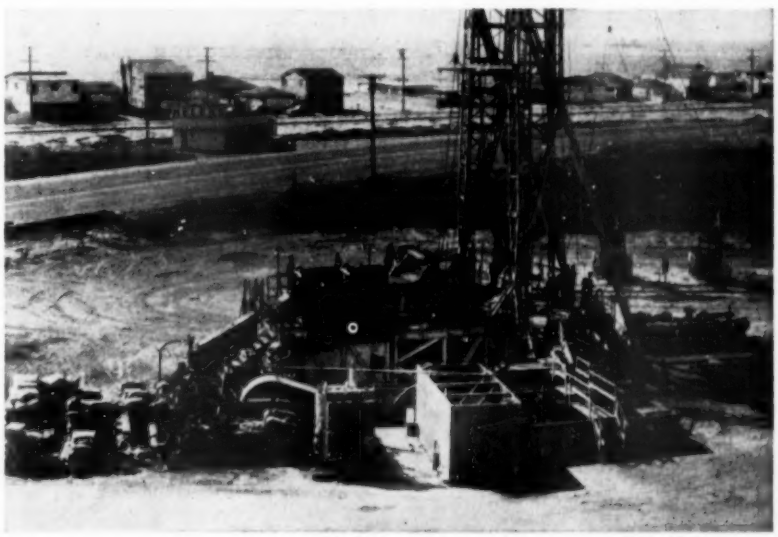
Purpose of the project is to gain more knowledge of the anticlinal structure from which the Wilmington field is producing 125,000 bbl. daily. Indications are that it continues further southeast, possibly as much as 4½ miles. While Wilmington's deeper pays may not extend much further, Ranger zone production is believed to extend to the southeast city-limit extension.

Injection Results Promising

LONG BEACH. — Results of the first 8 months of gas injection in this city's pilot pressure-maintenance operation in Wilmington field indicate the program may prove successful.

George Hilty, principal production engineer for the Harbor Department, which is supervising the project, said oil production from the pools receiving gas has tended to level off in recent weeks, instead of continuing to decline. Several more months must pass, however, before any valid conclusions can be drawn, Hilty said.

Gas has been injected in eight wells in the field at a rate of about 7,000 M.c.f. since May when a $385,000 compressor plant was installed to boost field gas to about 1,100 psi. Seven of the wells are on parcels operated by Long Beach Oil Development Co., and the other is in Richfield Oil Corp.'s Pier-A parcel. All are injecting gas into the Terminal zone, five into upper Terminal sands, the remainder into lower Terminal pays.



Newport Beach Has Producer

LOS ANGELES.—City-owned tidelands lying offshore from Newport Beach were proved oil productive by a slant-hole exploratory well jointly drilled by Monterey Oil Co. and Humble Oil & Refining Co., with the former as operator.

Their first well, 1 Newport Beach, has been completed pumping 250 bbl. of clean 20°-gravity crude daily from the drilled depth of 4,258-4,443 ft. H. C. Pyle, Monterey president, announced that a second well was to be started immediately from the drill site adjacent to the west Newport Beach city limits.

The discovery was the second "hole" for the wildcat. When spudded in September objective was Miocene production at a vertical depth of about 6,000 ft. and some 1,700 ft. seaward from the well site. This hole was carried to 7,112 ft., and then was plugged back to 900 ft. for redrilling. The second hole was drilled to 4,518 ft. then plugged to 4,445 ft. for completion.

The city of Newport Beach, which was granted title out to the 3-mile limit in 1919, will receive a royalty which begins at 12½ per cent for the first 80 bbl. of oil and increases upward in accordance with the State Lands Commission formula. Property owners along the beach also will participate for granting drilling easement under their properties.

Trade Policy Scored

Texan urges Congress to keep foreign trade control

WASHINGTON.—Authority over international trade should be taken out of the hands of the State Department and returned to Congress and the Tariff Commission, H. J. Porter, Houston, Tex., independent oil operator, declared last week.

Porter, who is a Republican national committeeman, appeared before a Senate interior subcommittee headed by Sen. George W. Malone of Nevada investigating the availability of oil and strategic materials in the event of war.

State Department scored . . . Differing radically from the opinions expressed by President Eisenhower on the need for continuing the reciprocal trade program, Porter told the subcommittee there has been no change in the thinking of State Department officials under the present administration and "I sometimes wonder if they think more of the development of foreign countries than of making us strong."

"You cannot have an adequate supply of domestic crude oil in time of emergency unless you make it profitable to drill for oil and produce it during peacetime or when there is no emergency," he told Malone.

Protecting supply . . . Porter declared there is no assurance that oil from the Middle East would be available in the event of war with Russia. It was pointed out that Brig. Gen. Alfred H. Johnson, director of the petroleum logistics division of the Defense Department, testified earlier that it was "problematical" whether Middle East oil would be available, and said it was planned to have other Defense Department officials testify later on whether they think Middle East oil could be protected in a war.

Porter asserted that Texas is the only state with a "drastic" proration law and that the other states are much less vigorous in controlling production. He explained how Texas output is geared to market demand and complained that with about 50 per cent of the production, the state takes 90 per cent of the impact of oversupply due to imports.

Asked by Malone for his view on representations made to the subcommittee that we should import oil to save our own resources, Porter declared that would be "the quickest way to bring on a general depression."

We should have supplementary supplies of foreign-produced oil, he said, but they should not be permitted to increase to the point where they supplant domestic output.

The setting of import volume cannot be left to the judgment of the individual foreign producers, Porter asserted. He charged the importing companies are not using "business statesmanship," but commented that the problem is not a new one and has been fought over for years.

Phillips' decision . . . Porter told the subcommittee that Congress should be concerned over the recent Supreme Court decision in the Phillips case. "Something has to be done about that because if the power (imposed on the Federal Power Commission by the decision holding Phillips subject to the Natural Gas Act) is exercised by the commission discovery of gas reserves will decline and a lot of small gas reserves will be shut in," he said.

Porter charged that under the decision, the city of Milwaukee (one of several consuming areas which initiated the suit) will be able to set the price of natural gas in Texas.

Shell Gets Tax Writeoff

WASHINGTON.—A certificate for accelerated expansion of the 50,000-bbl. refinery planned by Shell Oil Co. for the Puget Sound, Washington, area has been issued by the Office of Defense Mobilization.

The plant, to include a crude unit and catalytic cracking, catalytic reforming, catalytic polmerization, liquefied petroleum gas recovery and treating facilities, will cost $75,000,000.

The company was granted a 5-year writeoff of 65 per cent of the $21,870,000 basic refining equipment cost, 45 per cent of $31,430,000 for auxiliary equipment and 15 per cent of $2,560,000 for buildings.

Gas Lease Bids Invited

WASHINGTON.—The Bureau of Land Management is inviting bids on oil and gas leases on 120 acres of land in the known geologic structure of Monroe gas field, 15 miles southeast of Farmerville, Union Parish, Louisiana.

Bids will be opened January 20 on two leases of 40 and 80 acres, respectively, to be awarded to the qualified bidders of the highest cash bonus on the usual royalty and rental terms.

FTC Approach Is New

Contract's actual effect on competition considered

WASHINGTON.—The Federal Trade Commission has adopted a new approach to the question of the legality of exclusive dealing contracts under the Clayton Act.

The "actual competitive effect" of such contracts rather than their mere existence will be considered before deciding whether they violate the law.

The courts have held the government needed only to show the existence of exclusive dealing arrangements and that a substantial segment of commerce was affected by them. On that theory, the Supreme Court ruled in favor of the government in the case against Standard Oil Co. (Calif.) in 1949. There have been other similar cases, including one against the Richfield Oil Co. A suit against Sun Oil Co. is scheduled to come up for trial in Philadelphia January 18.

The commission's present interest involves an appeal by a respondent, not an oil company, from a decision holding the respondent enforced exclusive dealing contracts with retail dealers in violation of Section 3 of the Clayton Act.

The commission has remanded the matter to the hearing examiner with instructions to take evidence to determine whether, in fact, the exclusive dealing contracts did result in the lessening of competition.

To reach a conclusion, the commission said, the examiner should accept evidence from the respondent in support of his claims that there has been an increase in the number of his competitors, that the volume of business of his competitors has increased, that his share of the market has been decreasing, that his dealers constitute a small percentage of the total number of dealers in his industry in the country, and other matters relating to the effect on competition.

"These factors, in our opinion, all have a very real bearing on whether there may be, or already has been, a substantial lessening of competition due to respondent's exclusive dealing contracts," the FTC said in its opinion.

"From our reading of the statute, we cannot conclude that evidence of the effect of an exclusive dealing agreement on competition is immate-

rial in a Federal Trade Commission proceeding alleging violation of Section 3 of the Clayton Act."

A reading of that section, the opinion explained, "clearly indicates Congress intended to outlaw only those exclusive dealing agreements which are lessening or which if allowed to continue will probably lessen competion or tend to create a monopoly."

PAD Dies March 31

Officials hope to close doors of agency earlier

WASHINGTON. — Petroleum Administration for Defense officials have set a target date of March 31 for final closing of the agency but hope they can lock the door even earlier.

There are a number of formalities to be gone through before the emergency agency can close down completely. Deputy Petroleum Administrator Joseph A. LaFortune is anxious that there be no break in the work to be transferred from the PAD to the Interior Department.

The definite program assigned to the revived Oil and Gas Division has not yet been approved, nor has the Department of Justice been asked to take the steps necessary to transfer the Foreign Petroleum Supply Committee from PAD to OGD jurisdiction. Provision also must be made for new studies of defense oil requirements which the National Security Council is expected to ask next spring through the Office of Defense Mobilization.

"How long this will take is impossible to say at this point," LaFortune said, "but it now looks as if it could take another 2 or 3 months. That is the best estimate I can make at this time.

"The actual date, of course, will be for the Secretary of the Interior to decide," LaFortune pointed out. "What we are doing is trying to work out the preliminaries, so that the change can be made smoothly and in a way that will serve the interests of all concerned, particularly, of course, those related to the national defense."

Gathering Tax Case in Court

WASHINGTON. — Constitutionality of the Texas natural-gas-gathering tax will be argued before the Supreme Court early next year.

The case has been set down for argument during the week of January 4, and a final decision whether the tax shall stand or fall is expected before spring.

Constitutionality of the law is being

WATCHING WASHINGTON

Bertram F. Linz

Needed: More Helium

The oil and gas industry may have to give the government an assist in helium production within the next few years.

Demand already is very close to the 200,000,000 cu. ft. a year capacity of the four government plants at Shiprock, N. M., Amarillo and Exell, Tex., and Otis, Kans., and might be more were it not for a shortage of transportation.

In the past four fiscal years (1950-53) production jumped from 63,000,000 to 152,000,000 cu. ft. At present rates production in the current fiscal year will be around 170,000,000 cu. ft., in fiscal 1955 up to 192,000,000.

More than 60 per cent of the helium is consumed by the Government itself—by the Navy for lighter-than-air craft, the Weather Bureau for high-atmosphere observation balloons, the military as a propellent for guided missiles, and by the Atomic Energy Commission. These latter two uses may in the future demand considerable quantities beyond the ability of the government plants to produce.

The present reserve from which the Government is drawing is estimated at more than 5,000,000,000 cu. ft., but there are substantial reserves known to underlie other public lands. There is enough helium to last quite a while, but getting it out of the ground is another matter

In the near future the Government will have to think seriously about expansion of output and will have to increase its own facilities or encourage the industry to produce natural gas from which the helium can be extracted as it moves to market.

No 1954 Recession

The volume of business in 1954 is expected by industry leaders to be about the same as it was this year.

There will be some variations between industries—some doing a little better, some about the same, and some not quite as well as in 1953.

Executives of 41 industry associations recently canvassed the outlook at a joint meeting. Their reports do not indicate any present expectation of a recession.

Representatives of six industries saw their business definitely better next year. Seven others saw theirs about the same or a little better, while eight predicted their business would be unchanged or not quite as good. Three industries expect price declines, forecasting a drop in dollar volume but an increase in physical volume.

Only 17 industries now look for any appreciable decline in business. Fourteen of them expect that volume next year will be 2 to 15 per cent under 1953; two others look for a drop of 20 to 25 per cent. Only one industry expects a drop of more than 25 per cent, attributable to present excessive inventories.

Summing up the situation, the association executives saw no cause for concern over a serious business setback. They calculated that even should a decline of as much as 25 per cent occur next year it will still be the third or fourth best year in industry history.

Threat to Big Three

Failure of the Government's effort to sell its synthetic rubber plants could have serious implications for American industry.

If the plants are not sold now they might never be, and government ownership of the raw materials of a basic industry could well be the forerunner of ever-increasing intervention, according to Rep. Paul W. Shafer of Michigan.

There are indications that because of a current over-production of natural rubber and declining prices, American companies which could operate the government plants are not submitting very many bids. That could be dangerous, according to Shafer, who probably knows more about rubber than any other man in Congress.

Shafer's warning was directed at the rubber, oil, and steel industries.

"If any one of those three falls within the permanent structure of a government bureaucracy," he said, "then we may see the first cell developed in a growth which may eventually engulf our entire private-enterprise system."

However, Shafer said, Socialist opponents of disposal know that "a little government ownership of basic industry" in time is certain to develop into something bigger.

tested by the Panhandle Eastern Pipe-line Co. and the Michigan-Wisconsin Pipe Line Co., pressing the case on behalf of all of the 117 pipe-line companies which paid the tax under protest.

The tax of .45 cent per M.c.f. on natural gas gathered in Texas for marketing in other states was enacted in 1951 and was immediately challenged by the pipe-line companies as unconstitutional.

Approximately $25,000,000 collected thus far is being held in escrow pending final determination of the case.

Refining Dividends Dip

WASHINGTON.—Publicly reported cash dividend payments of refining corporations in November amounted to $4,600,000, compared with $13,200,000 in the same month last year.

For the 11 months ended with November, however, the Department of Commerce announced that dividends showed a slight increase over last year, $736,300,000 against $728,000,000. The increase was due to higher dividend rates and share capital expansion, the department explained.

ROCKY MOUNTAIN

Oil Outlet Nearer

Shell Pipe Line named to plan Williston basin line

HOUSTON.—Shell Pipe Line Corp. has been appointed by 12 Williston basin oil-producing companies to make a detailed study of possible markets, routes, and costs for a big-inch pipeline outlet for basin crude.

Shell will submit preliminary design and engineering plans for such an outlet by early next spring, it was decided here at a meeting of a committee representing the producers.

An official with one of the companies squelched reports that it has already been decided that the line will run through the Minneapolis area to Chicago. Where the line, tentatively designated the Sioux Pipe Line System, will be built will not be decided until next spring when Shell makes its report, it was said.

Companies represented by the committee then will decide if they wish to go along with the project. These include: Murphy Corp., Columbian Carbon Co., Atlantic Refining Co., Northern Pacific Railway Co., Ohio Oil Co., Placid Oil Co., Shell Oil Co., Socony-Vacuum Oil Co., Inc., Southern Production Co., The Texas Co., Tide Water Associated Oil Co., and Woodley Petroleum Co.

Chairman of the committee is C. H. Murphy, Jr., president of Murphy Corp., which currently has the largest production in the Montana portion of the basin.

Destination? . . . Several possible plans have been considered for a pipe line from the basin *(The Oil and Gas Journal, September 21, 1953, page 152)*. These include:

. . . Laying a line north approximately 200 miles to a connection with Interprovincial Pipe Line Co. at Regina, Sask., and either marketing in Detroit through Interprovincial all the way or in the Minneapolis area through a proposed 200-mile branch off Interprovincial from Clearbrook, Minn., or Superior, Wis.

. . . Piping the crude 200 miles to the Billings, Mont., refining area.

. . . Laying a line south about 250 miles to connect with the big Platte crude line to the Wood River, Ill., refining area.

. . . Marketing in the Minneapolis and Chicago areas through its own facilities—which would mean laying a line well over 1,000 miles long.

Wildcat Near Completion

RAPID CITY, S. D.—Shell Oil Co. last week was preparing to complete South Dakota's first commercial oil well after extensive tests.

The company was putting up tanks on the location of 1-A State and had ordered pumping equipment for the well. The rank wildcat is about 30 miles southeast of production at Little Beaver field, Fallon County, Montana, and about 75 miles south of the nearest production in North Dakota, the recent Billings County Fryburg discovery.

The well was tested last week after drilling to 9,335 ft. and plugging back to 8,587-8,600 ft. Crews swabbed 142 bbl. of about 21°-gravity oil and 3 bbl. of water in a 17-hour period.

Driller Dies in Well Fire

TIOGA, N. D.—The Williston basin's first wild well and fire has been brought under control, but it took the life of a driller, burned two derrick men and caused $200,000 in damage to the drilling rig.

The well, 1 Lawrence Pederson, jointly owned by Hunt Oil Co. and Amerada Petroleum Corp., headed, flowed oil and gas, and ignited during a drill-stem test after it was drilled to 8,278 ft. The explosion trapped Bailey Swope, of Ray, N. D., and formerly of Texarkana, Tex., and he was burned to death. W. B. Banta and S. A. Rambo, both of Ray, suffered third-degree burns.

Wildcat Test Has Show

WILLISTON, N. D.—Drill-stem tests of 1 Government-Dorough, Gulf Oil Corp.'s first venture in North Dakota, have recovered 40 ft. of 22°-gravity oil in the 9,276-9,341-ft. interval in a 2-hour test.

Oil staining was found in three cores before the test of the Gulf-Northern Pacific Railway well. It is a rank wildcat located 18 miles east of the Montana border and 28 miles northwest of the Billings County Fryburg field of North Dakota.

SOUTHWEST

Tardy Gas Reports Hit

AUSTIN.—Pipe-line severance notices will be served on Texas operators who are late in turning in monthly reports on their gas production and disposition, according to a memorandum issued by the Texas Railroad Commission here.

The order was brought about because the delinquent reports caused the commission's gas department to be tardy in issuing the Monthly Summary of Texas Natural Gas. The memorandum pointed out that "the statistical information contained in this report is of little value if the report is not prepared as soon as possible. For this reason we instructed our deputy supervisors to issue pipe-line severance notices for all wells or leases connected to a plant delinquent for one of the above reports on the day following the day the report is due."

University $10 Million Richer

AUSTIN.—The University of Texas permanent fund was $10,372,500 richer last week as oil operators bought leases on 50,358 acres of West Texas land.

Atlantic Refining Co. topped the bidders with $710,000 on a 341-acre tract in Crockett County. Gulf Oil Corp. paid $2,640 per acre for 161 acres in Andrews County.

Search Moves North

Exploration permits taken on more than 40,000,000 acres in Northwest Territories in 3 years; shows spur activity

EDMONTON, Alta.—Oil companies are showing increased interest in exploring for oil in the Far North.

More than 40,000,000 acres north of the sixtieth parallel have been taken up under permit during the past 3 years, according to Dr. Arthur B. Irwin of Edmonton, petroleum conservation engineer for the Northwest and Yukon territories.

During the past year, Dr. Irwin said, seven wells and three test holes have been drilled in the Northwest Territories, while four wells at Norman Wells, where Imperial Oil, Ltd., has production, have been reconditioned. Numerous airborne magnetometer and gravity meter surveys have been carried out. Exploratory activity in the upper Mackenzie River basin, accelerated by the discovery of noncommercial shows, is continuing high.

New permit rules . . . Much of the activity is considered due directly to new federal regulations on the taking of permits. Formerly an oil company interested in a certain area simply staked out a 64,000-acre tract. This resulted in unintentional overlapping of staked areas, difficulty in defining a permit area in relation to prominent topographic features, and considerable extra expense to permit applicants.

Under the new system, permit areas are granted on the basis of a map grided by each 10-minute parallel of latitude and each 15-minute meridian of longitude. The resulting "grid" areas are approximately 64,000 acres at the sixtieth parallel, but only about 52,000 acres at the sixty-sixth parallel due to convergence of meridians. Half-grid areas also may be taken.

Operators . . . Major operators in the Northwest Territories include Imperial with over 3,000,000 acres, the joint holdings of British American Oil Co., Ltd., and Hudson's Bay Oil & Gas Co., Ltd., with about 2,000,000 acres, and Conwest-Western Leaseholds, which owns the Pelly River blocks comprising two areas of about 2,500,000 acres each. Others are Northwest Territories Petroleums, a pioneer in the territories, California Standard Co., Sun Oil Co., and Bullock & Hughes.

Bullock & Hughes, which holds some grids in the Pelly River Plateau, have tentative plans for a drilling program next year which will necessitate bringing a drill rig over a circuitous river route from Fort Nelson, B. C., via the Nelson River, the Liard, the Mackenzie, and the overland through virgin country to the exploration site.

Drilling this year has been carried out mainly by Northwest Territories Petroleums and British American and Hudson's Bay Oil & Gas.

Dr. Irwin said that Imperial, Sun, and Cal-Standard have indicated they will carry out seismograph work this winter.

Drilling Permits Issued

REGINA, Sask.—Imperial Oil, Ltd., has been granted exploration and drilling permits on nearly one million acres of crown lands in the Humboldt-Quill Lake-Watrous area of Saskatchewan.

Ten separate permits on a total acreage of 971,680 acres become effective in 1954, some on January 1 and others March 1. The area involved has had a "very limited" amount of exploration, according to J. H. Brockelbank, Minister of Mineral Resources.

Rental on the tracts will be 2 cents per acre the first year, 5 cents the second and 10 cents per acre the third and last year of the permits. Work requirements demand 20 cents per acre on any type work the first year, 40 cents per acre and a minimum of $15,000 on actual drilling the second year, and 60 cents per acre and $15,000 minimum on drilling the third year.

Lube-Plant Start Planned

EDMONTON, Alta.—Imperial Oil, Ltd., plans to start construction here soon of the first lube-oil manufacturing plant in western Canada.

The plant will cost an estimated $11,000,000 and will produce roughly 750,000 bbl. annually of high-quality automotive and industrial oils from selected Alberta crudes.

It will be erected on a 15-acre site left vacant for this purpose when Imperial built its refinery here on the eastern outskirts of the city.

At present there are only two lube-oil manufacturing plants in all of Canada. These are Imperial's plant at Sarnia and the Clarkson, Ont., plant of British American Oil Co., Ltd.

Expansion Planned

Interprovincial to lay 600 miles of loops next year

EDMONTON, Alta.—Interprovincial Pipe Line Co. has revealed plans to lay about 600 miles of loop line next year along its system between Edmonton and Superior, Wis.

The construction program will raise throughput capacity out of Edmonton to more than 200,000 bbl. daily, compared with an average throughput of 155,000 bbl. a day in 1953, according to T. S. Johnston, president of Interprovincial and its American subsidiary, Lakehead Pipe Line Co.

This will be the second step, Johnston said, in a program to provide greater movement of Canadian crude to Ontario refineries. The first phase was Lakehead's recently completed extension of the Interprovincial system from Superior to Sarnia, Ont.

Two-thirds of the new loops, which will be 24 and 26-in., will be laid in Canada, the rest in the United States. In addition, five pumping stations will be built in Canada and four more in the United States. Eight of the stations will be between Regina, Sask., and Superior and one on the new 30-in. line between Superior and Sarnia. The entire construction program is scheduled for completion by the end of next year.

Gas Bill Gets Last Reading

OTTAWA, Ont.—The House of Commons has given third and final reading to a government bill giving the Board of Transport Commissioners complete jurisdiction over location, construction, and operation of interprovincial and international oil and gas pipe lines in Canada.

The bill is an emergency measure drafted hastily to block Consumers Gas Co.'s planned importation to the Toronto area of natural gas from the U. S. Southwest via lines of Tennessee Gas Transmission Co. and Niagara Gas Transmission Co.

It is generally considered that without the big Toronto market the politically popular all-Canadian gas-transmission line from Alberta to eastern Canada would be economically unsound.

PERSONALS

New President

Williamson named to top Southern Production post

ROY C. WILLIAMSON, a former college athlete, coach, and school teacher, last week became president of Southern Production Co., Inc., Fort Worth.

He succeeds C. T. Chenery, who has been both chairman of the board and president. Chenery remains as board chairman.

Williamson left high school and junior college teaching and coaching to enter the oil industry in 1926, taking a Texas oil-field job with J. H. Hughes Development Co. during the boom around Borger. Earlier he had attended Baylor University, where he was an outstanding football and baseball player his last 2 years, and a member of the All-Southwest football team.

After a period of work in the field, Williamson decided to further his oil education. He enrolled in petroleum engineering at the University of Oklahoma, taking a job at the same time in nearby Oklahoma City field.

After receiving his engineering degree from O.U. he joined Pure Oil Co. and worked up from gang pusher to driller, then production superintendent. He left Pure in 1937 to join Lion Oil Co. at El Dorado, Ark., and was production superintendent when he resigned in 1943 to become associated with Southern Production. Four years later he was elected vice president and a member of the board of directors.

The new president's pride in Southern Production was boosted recently when the company announced development of a new fracturing technique which may greatly increase production in the Spraberry Trend in West Texas *(The Oil and Gas Journal, December 7, page 74)*. Southern Production also has operating offices in Louisiana, New Mexico, Oklahoma, Wyoming, East Texas, and the Texas Panhandle.

Williamson, now 52, grew up in Arkansas and attended high school at Fort Smith before going to Waco to attend Baylor. The busy executive is still interested in football and baseball and finds time to go hunting and fishing with his favorite companions, his wife, and his son Roy, Jr., now in his junior year at O.U. studying petroleum engineering.

Wayne H. Mack, geologist for Magnolia Petroleum Co., has been transferred from Tyler, Tex., to Jackson, Miss.

John H. Wilson, formerly production superintendent in Oklahoma for C. L. McMahon, Inc., in Tulsa, has joined R. W. Rine Drilling Co. as production superintendent at Wichita.

G. C. Montgomery has been named superintendent of Shell Oil Co.'s refinery at Wilmington, Calif., succeeding the late S. J. Meisenburg. Montgomery was formerly assistant superintendent in charge of administration at Wilmington.

HARSCH

Raymond Harsch, manager of the asphalt department of Shell Oil Co., San Francisco, was elected chairman of the executive committee at a recent meeting of the board of directors of the Asphalt Institute. Officers reelected are: **Bernard E. Gray,** president; **Herbert Spencer,** secretary; **George R. Christie,** Socony-Vacuum Oil Co., Inc., treasurer; and **John N. Smith,** also of Socony, assistant treasurer. Vice presidents elected for the five U. S. geographical divisions of the Institute are: **Christie,** Atlantic Coast; **Lysle Walker,** Leonard Refineries, Inc., Ohio-Great Lakes; **Chester Eberle,** Macmillan Petroleum Corp. (Arkansas), Mid-West; **James J. Kelly,** Kerr-McGee Oil Industries, Inc., Southwest; and **W. F. Lyte,** Douglas Oil Co. of California, Pacific Coast. These officers and **D. N. Myers** of Byerlyte Corp., ex-officio as retiring chairman, constitute the executive committee for the coming year.

Troy C. Kadel, assistant district production superintendent for Sinclair Oil & Gas Co., has been transferred from Eldorado, Tex., to Fort Morgan, Colo.

W. H. Barlow will become manager on January 1 of the research department being established by Ohio Oil Co. to carry out a long-range program of petroleum research. The department will work toward an integrated research operation which will investigate technological problems arising in all of the company's operating departments. Initially, however, emphasis will be on problems in production and exploration. Barlow joined Ohio in 1942 and was advanced to his present position of assistant chief petroleum engineer in 1952.

H. M. Bayer, presently manager of exploration for The Texas Co. in Fort Worth, will be placed in charge of the firm's Fort Worth production division following the retirement December 31 of **F. J. Adams,** vice president of Gulf Oil Corp. and Gulf Refining Co. Bayer has been with production divisions of Gulf companies for nearly 30 years. Adams joined Gulf in 1910 and in 1950 was elected vice president and placed in charge of operations of the newly established Fort Worth production division. Adams is a member of the board of directors of the Texas Mid-Continent Oil and Gas Association.

Ira B. Stitt, Jr., has been promoted by Magnolia Petroleum Co. from district petroleum engineer at Brownfield, Tex., to assistant division engineer at Midland.

Edgar O. McCutchen, formerly a geologist at Casper, Wyo., for Amerada Petroleum Corp., has joined Western Geophysical Co. of America as a computer.

James A. Grimes, Jr., has been promoted by Ohio Oil Co. from district superintendent at Midland, Tex., to assistant division production superintendent at Houston.

Leo R. Nuhfer, safety director of Peoples Natural Gas Co., has been elected to a 2-year term as chairman of the accident-prevention committee of the American Gas Association.

PERSONALS

Frank W. Abrams, chairman of the board of Standard Oil Co. (N. J.), last week announced he will retire January 1 after 42 years with Jersey Standard and its affiliates. Abrams' retirement was announced before a meeting of more than 2,000 Jersey employes December 17 in Center Theater, New York. The company announced that a donation of $100,000 is being made to Syracuse University, Abrams' alma mater, in his honor.

J. R. Mares, Texas City, Tex., a vice president of Monsanto Chemical Co., and general manager of the firm's Texas division, has been named general manager of a newly created research and engineering division.

F. H. Taylor has been transferred from Glendive, Mont., to Casper, Wyo., as division production manager for Shell Oil Co. He replaces **F. J. Toth,** who has been transferred to Billings, Mont.

H. E. Braunig, engineer for Gulf Oil Corp. in Kilgore, Tex., has been elected chairman for 1954 of the East Texas chapter of the American Petroleum Institute's Division of Production. He succeeds **Harry Pistole,** Humble Oil & Refining Co., Tyler. Vice chairmen elected include: **Bert Cowder,** Humble, Overton, program; **S. J. Okerson,** Stanolind Oil & Gas Co., Overton, arrangements; **Gene L. Scheirman,** Shell Oil Co., Kilgore, membership; and **Jim Foster,** Sun Oil Co., Kilgore, finances. **Brook D. Tarbel,** Magnolia Petroleum Co., Kilgore, was elected secretary-treasurer.

R. E. Woodward, production foreman for Socony-Vacuum Oil Co., Inc., has been transferred from Cheyenne, Wyo., to Dickinson, N. D.

Robert L. Johnston, district geologist at Bakersfield, Calif., for Western Gulf Oil Co., has been elected president of the San Joaquin Geological Society. **Horace E. Harrington,** Superior Oil Co., has been named vice president, and **Charles C. Bishop,** Intex Oil Co., secretary-treasurer.

O. L. Lewis, with C. F. Braun & Co., Alhambra, Calif., was installed as chairman of the petroleum division of the American Society of Mechanical Engineers at the group's annual meeting in New York recently. **P. E. Frank,** Sinclair Oil Co., New York, was installed as secretary. Operating committee chairmen for 1954 include: **F. O. Stivers,** Humble Pipe Line Co., Houston, transportation; **J. P. Mooney,** Humble Oil & Refining Co., Baytown, Tex., refining; **H. H. Meredith,** Humble, Houston, production; **F. K. Zerbe,** A. O. Smith Corp., Houston, materials; and **Allen F. Rhodes,** McEvoy Co., Houston, manufacturers. **G. L. Farrar,** The Oil and Gas Journal, Tulsa, is chairman of the press committee.

Atlantic Official Receives Honor Scroll

Hugh W. Field (center), vice president and director of the research and development department (left), president of the Institute, and Dr. Walter Thomas (right), chairman of the Pennsylvania chapter of the American Institute of Chemists in Philadelphia recently. Dr. Lincoln Work ment of Atlantic Refining Co., was awarded the annual honor scroll of the Pennsylvania chapter, are shown making the presentation.

R. R. Brown, Franklin, La., division production superintendent for Shell Oil Co., will join the mechanical-engineering staff of the company's area office. He will be succeeded at Franklin by **C. E. DeWitt,** formerly Donaldsonville, La., division exploitation engineer. **C. A. Brooks,** formerly on the New Orleans area exploitation engineering staff, will go to Donaldsonville as division exploitation engineer.

W. G. COPELAND

W. G. Copeland has been appointed general superintendent of The Texas Co.'s refinery at Port Arthur, Tex. **E. W. McNealy** has replaced him as superintendent of Eagle Point refinery at Westville, N. J., and **J. C. Williams** has succeeded McNealy as assistant superintendent of the firm's refinery at Lockport, Ill. **F. D. Davis,** formerly assistant superintendent of the refinery at Casper, Wyo., has been made assistant superintendent of the West Tulsa refinery. **V. K. Brandenburg,** formerly supervisor of operations at Lawrenceville, Ill., refinery, has replaced Davis.

Jack Lemley, production engineer in the Kettleman Hills field for Standard Oil Co. of California, has been elected chairman of the Coalinga - Kettleman chapter of the American Petroleum Institute. Other officers for 1954 include **Erv Dagan,** Standard Oil, vice chairman; and **Robert Lydon,** engineer for P. S. Magruder.

Brian Kirby, senior geologist for Bay Petroleum Corp., has been elected president of the Kansas Geological Society for 1954, succeeding **William G. Iverson,** also of Wichita. **George Reed,** geologist in Wichita for Nadel & Gussman, independent producers, was named vice president, and **Glen Ford,** with The Texas Co. in Wichita, was elected secretary-treasurer.

O. M. Giffin, formerly production foreman at Newhall, Calif., for Sunray Oil Corp., has been made production superintendent in the San Joaquin Valley and Coalinga area. He replaces **A. L. Sims** who has been transferred to the Coalinga area. **A. J. Cresswell** has been made production foreman under Giffin. **Jack E. Hiatt,** formerly production foreman at Coalinga, has been transferred to the Newhall area

PERSONALS

to replace Giffin. **L. F. Andersen,** formerly head meterman at the Newhall gas and gasoline plant, has been named production foreman for the new Sacramento Valley area in Glenn County. He has been replaced at the Newhall plant by **Howard Fenton.**

Harlan H. Pigott has been elected president of Carnegie Natural Gas Co. and Appollo Gas Co., Pittsburgh. Pigott has been vice president in charge of operations of Equitable Gas Co., Pittsburgh, for more than 3 years and joined the firm in 1927. He is a director and past president of the Pennsylvania Natural Gas Men's Association, a director of the West Virginia Oil and Natural Gas Association, and a member of the Engineers' Society of Western Pennsylvania.

Bill Nugent has resigned as district geologist at Shreveport for Pure Oil Co. to become district geologist at Jackson, Miss., for Honolulu Oil Corp. He had been with Pure for 5½ years, the last 3½ as district geologist at Shreveport.

R. L. Hockley has resigned as president of Davison Chemical Corp. and has joined Mathieson Chemical Corp. as vice president, effective January 1. His headquarters will be in Baltimore.

W. E. MUELLER

W. E. Mueller has been promoted from executive vice president, a post he has held since September 1952, to president of Colorado Interstate Gas Co., Colorado Springs, Colo., effective January 1. He replaces **Robert W. Hendee,** who has resigned after being president and a member of the board of directors since 1943. Hendee will continue on the board as a consultant to company management and also will do consulting for other gas companies. Mueller was named to the firm's board in May, and was a senior vice president and member of the board of Tennessee Gas Transmission Co. in Houston before joining Colorado Interstate.

Robert Chancellor, district stratigrapher with Shell Oil at Grand Junction, Colo., for 5 years and formerly division stratigrapher in East Texas, has resigned to become a general geological consultant in Denver.

Manley Awarded Plaque at Special Dinner

A service recognition plaque was presented to Harold W. Manley (second from left), former member and first chairman of the Snyder plant advisory committee, at a dinner given in his honor in Tulsa recently. The committee supervises the management of the gasoline plant which operates for the major portion of Kelley-Snyder field, Scurry County, Texas. It is one of the largest gasoline plants in the world from the standpoint of liquid products volume from natural-gas throughput. Left to right, are: J. M. Kindle, Lone Star Producing Co., Dallas; Manley, independent operator who recently resigned as vice president of Sunray Oil Corp.; Robert Boykin, Fullerton Oil Co., Pasadena, Calif.; R. E. Foss, Sunray Oil Corp., Tulsa, who made the presentation; Frank M. Perry, Cities Service Oil Co., Bartlesville; and M. R. Lents, Scurry Natural Gasoline Corp., Houston.

Charles W. Leaf, production engineer for The Texas Co., has been transferred from Denver to Cut Bank, Mont.

Warren H. Smith has been promoted by The Texas Co. from seismic party chief at Houston to seismologist at Calgary, Alta.

H. C. Hobbs, geologist formerly with Continental Oil Co. and Lion Oil Co. in the Rocky Mountains, has joined Youngblood & Youngblood in Longmont, Colo.

B. L. Rodzianko has been named assistant manager of General Petroleum Corp.'s refinery at Ferndale, Wash. He joined General Petroleum's parent firm, Socony-Vacuum Oil Co., Inc., in 1938 as a chemical engineer at the Paulsboro, N. J., refinery, where he was active in development of the Thermofor catalytic cracking process. He was transferred to General Petroleum in 1944 and has held numerous jobs at its refinery at Torrence, Calif., the most recent being senior refinery engineer.

Dr. Guy Waddington and **D. B. Taliaferro** have been presented the highest honor of the Department of Interior, the distinguished-service award with its accompanying gold medal. The presentation was made December 8 in Washington, D. C., by **Douglas McKay,** department secretary. Taliaferro is in charge of the secondary-recovery branch of the department's petroleum experiment station at Bartlesville, Okla., and Dr. Waddington is chief of the station's thermodynamics branch.

DEATHS

Robert Galbreath, 89, pioneer Oklahoma independent operator, died December 13 in Tulsa following an illness of about a year. He came to Oklahoma during the run of 1889 and staked a claim. Galbreath participated in the discovery and development of many Oklahoma fields, including Glenn Pool and Bald Hill.

Four Magnolia Petroleum Co. men were killed December 11 in the crash of a company airplane near Sherman, Tex. The victims, all of Dallas, were: **D. D. Standlee,** 42, assistant to the manager and assistant secretary of Magnolia Pipe Line Co.; **A. B. Franzen,** 45, chief accountant of Magnolia's producing division; **Folger B. Vallette,** 35, oil-purchasing department; and **Clarence A. Easton, Jr.,** 32, assistant chief dispatcher for Magnolia Pipe Line.

L. H. Hollingsworth, 53, production foreman for Ohio Oil Co., died recently in Inglewood, Calif. He had been associated with the company for 23 years.

Over Half of World's Reserves Now Concentrated in Middle East

by Dahl M. Duff
International Editor

THE OIL AND GAS JOURNAL'S country-by-country, company-by-company survey of the current international oil picture shows that:

- Crude-oil reserves of the non-Communist countries total nearly 126 million barrels. Including reserves of Russia and its satellites, the Journal's estimate of world total oil reserves is more than 135 billion barrels.
- There are more than 509,000 producing oil wells in the world, with average production totaling more than 11 million barrels per day. There are currently some 6,000 wells drilling.
- Operating refineries total 661, with combined capacities for processing 15.5 million barrels of crude daily. Thermal cracking capacity totals more than 4 million barrels daily, while catalytic cracking facilities can handle some 3.7 million barrels daily.

Reserves picture . . . The combined reserves of the non-Communist countries are now equal to approximately a 29-year supply at current rates of production. Of the Free World total, about 96½ billion barrels, or 77 per cent, is outside the United States. Furthermore, about 78.2 billion barrels, or 62½ per cent of the Free World total, is estimated to be in the huge accumulations of the Middle East.

These totals, shown in the accompanying tabulation, are based on inclusion of United States proved reserves as calculated at the beginning of this year. The relative position of the United States will show slight improvement when a new and larger figure for reserves as of January 1, 1954, becomes available early next year.

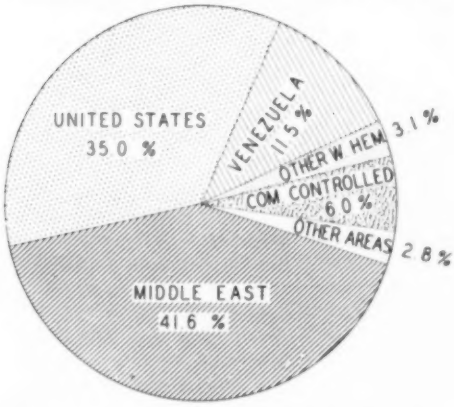
The overshadowing importance of the Middle East in the world's discovered underground oil resources is shown by the figures on some of the individual countries. The three main Middle East producing countries of Saudi Arabia, Kuwait, and Iraq are estimated to have total reserves of some 61 billion barrels. This is 48.5 per cent of the world total outside Russia and other Communist countries.

These three countries together have recently been producing at a rate of about 2,325 bbl. daily, an amount which represents approximately 19.5 per cent of Free World output. Even more striking testimony to the tremendous size and productivity of these major Middle East reservoirs is in the fact that there are fewer than 25 rigs operating in these three countries and most of these are in Iraq.

The reserve figures given here show substantial increases over those estimated a year ago. The Free World total as a whole is up 17 billion barrels, and of this, about 13.3 billion barrels is attributed to higher reserves in the Middle East. Most of the remainder is due to larger totals for the United States, Venezuela, Indonesia, and Canada.

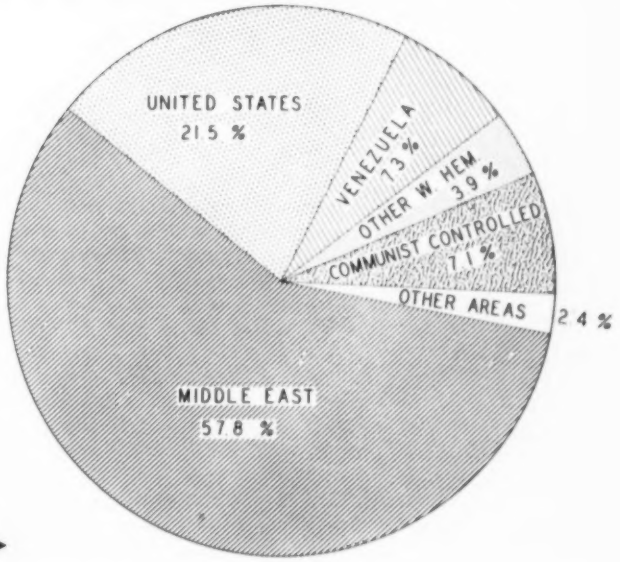
However, year-to-year comparisons in connection with foreign reserves are misleading since in the case of many

Middle East's slice of the pie has been increasing at U. S. expense



1949—78,320,000,000 bbl.

Today 135,000,000,000 bbl.



countries the changes often reflect the availability of better and more reliable estimates rather than any annual reassessment on an engineering and geological basis. This is particularly true for countries for which reserves information is not regularly disclosed, and these are by far most of the list.

The data shown in the accompanying tabulation are derived from a number of sources. Where available and where it is generally in line with industry estimates, official government information has been used as a basis for arriving at the current reserves position. Figures from previous years have been brought forward and revised in the light of known discoveries and extensions and depletion. Opinions of geologists and other competent officials in the industry have been followed.

In nearly all cases, the figures are to be treated as approximations. An effort has been made to arrive at proved reserves, although in some instances what might be called indicated reserves are reflected in the data. Figures exclude condensate and other gas liquids.

Canadian reserves are considered to be nearing the 2-billion-barrel mark and now exceed those of Mexico. Canadian reserves at the end of last year were placed at 1,745,000,000 bbl. daily. There has been a steady upward climb of several hundred million barrels annually in the reserves total since the Leduc discovery in 1927 touched off the exploration and development play in the prairie provinces.

Mexican reserves have been augmented during the last year by several discoveries of importance, especially

JOURNAL'S STATISTICAL REPORT ON

COUNTRY	RESERVES	PRODUCTION				REFINING			
	(1,000 bbl.)	(In thousands of barrels)					Capacity, thou. bbl. daily		
	Proved oil	No. prod. wells	Fields, daily	Accumulated to 7-1-53	No. wells drilling	No. oper. refrs.	Distillation crude	Cracking Thermal	Cracking Catalytic
W. Hemisphere:									
Argentina	325,000	1,285	77.00	530,052	2	16	174.6	65.5	.....
Bolivia	12,000	45	1.38	6,847	6	4	10.9	.....	.....
Brazil	50,000	152	2.39	3,213	4	8	97.3	26.5	35.0
Canada	1,950,000	4,004	270.00	327,669	135	40	514.6	154.3	143.8
Chile	55,000	12	3.05	2,913	3	1	20.0	13.4	.....
Colombia	550,000	1,528	106.10	601,698	39	3	30.7	.....	.....
Cuba	2,000	210	0.01	.....	1	3	7.7	2.4	.....
Ecuador	28,000	1,091	8.00	55,865	13	2	5.7	.....	.....
Mexico	1,725,000	1,276	201.00	2,708,100	.....	8	243.5	66.5	.....
Netherlands, W. I.	0	.....	.....	.....	.....	2	640.0	393.0	37.0
Peru	250,000	3,034	42.37	441,109	28	3	46.9	3.0	.....
Trinidad	285,000	2,047	56.82	450,389	28	3	120.0	32.0	15.0
United States	*29,044,000	475,615	6,512.00	46,704,626	5,513	320	8,090.3	2,564.0	3,067.3
Uruguay	0	.....	.....	.....	.....	1	28.0	.....	7.0
Venezuela	9,900,000	7,867	1,749.40	7,119,573	87	14	453.0	87.5	.....
Total	44,176,000	498,166	9,029.52	58,952,054	5,859	428	10,483.2	3,408.1	3,305.1
Europe and Africa:									
Algeria	5,000	45	1.89	738	2	.....	.....	.....	.....
Belgium	0	.....	.....	.....	.....	6	93.3	27.3	13.1
Denmark	0	.....	.....	.....	.....	3	0.9	.....	.....
Egypt	140,000	151	45.94	193,820	1	2	53.0	.....	6.4
France	32,000	525	7.01	24,275	7	13	474.7	78.2	39.2
French Morocco	13,000	80	2.14	2,463	1	1	2.1	.....	.....
West Germany	300,000	2,425	44.51	126,522	55	25	199.1	26.3	53.6
Italy	6,000	251	1.77	2,743	.....	31	358.8	52.0	22.4
Netherlands	100,000	163	15.76	27,224	2	2	198.5	41.4	25.0
Norway	0	.....	.....	.....	.....	1	1.0	.....	.....
Portugal	0	.....	.....	.....	.....	1	25.0	.....	10.0
South Africa	0	.....	.....	.....	.....	2	17.3	2.0	6.3
Spain	0	.....	.....	.....	.....	3	56.7	14.0	.....
Sweden	0	.....	.....	.....	.....	3	34.8	7.3	.....
Switzerland	0	.....	.....	.....	.....	1	4.0	1.0	.....
United Kingdom	3,500	243	1.13	5,730	.....	13	630.7	29.8	106.0
Total	599,500	3,883	120.15	383,515	68	107	2,149.9	279.3	282.0

in the new fields extending the old Golden Lane to the southeast. Some of this work is yet in an early stage of development. Estimates of the country's present proved reserves are based on announcements of the government company, Pemex, though excluding the liquid equivalent of natural-gas reserves which is given in the Pemex reports.

Exploration in Venezuela was marked by a number of new field discoveries, particularly in the Greater Oficina area. The new total of 9,900,000,000 bbl. shown for Venezuela reflects a net increase of about 450,000,000 bbl. At the end of last year, Venezuelan reserves stood at 9,454,000,000 bbl., reflecting an increase of 1,798,000,000 bbl. over the 4-year period from the end of 1948.

Of the countries of western Europe, Germany leads in crude-oil reserves as it does in production. The 300,000,000 bbl. shown for West Germany is considered to represent the proved total, although other estimates run considerably higher. Reserves in the Netherlands have been augmented over the last year as a result of successful exploration. French reserves are almost entirely in Lacq field in southwestern France, where a recent deep test produced gas but with considerable liquid. In Italy, the exploratory effort has been primarily successful in developing substantial natural-gas resources, although some light crude has been found. Remaining reserves in Egypt are subject to steady depletion since, prior to the recently opened program of International Egyptian Oil Co., all exploration

(Continued on page 250)

WORLD'S RESERVES, PRODUCTION, REFINING

COUNTRY	RESERVES	PRODUCTION				REFINING			
	(1,000 bbl.)	(In thousands of barrels)							
	Proved oil	No. prod. wells	Fields, daily	Accumulated to 7-1-53	No. wells drilling	No. oper. refrs.	Capacity, thou. bbl. daily — Distillation crude	Cracking — Thermal	Cracking — Catalytic
Middle East:									
Aden	0					1	120.0		12.0
Bahrain	280,000	80	29.54	148,352	1	1	205.0	35.2	26.0
Iran	15,000,000	42	23.74	2,663,200		2	502.5	75.0	25.0
Iraq	13,000,000	76	669.00	837,857	7	2	9.5		
Israel	0					1	86.0	43.0	
Kuwait	20,000,000	138	844.72	914,747	3	1	30.0		
Lebanon	0					2	16.3	0.6	
Qatar	1,500,000	15	78.61	71,770	2				
Saudi Arabia	28,000,000	138	834.52	1,449,479	6	1	189.0	26.0	
Neutral Zone	300,000	4							
Turkey	80,000	3	0.42	502	4	1	1.4		
Total	78,160,000	496	2,480.55	6,085,907	23	12	1,159.7	179.8	63.0
Other Asia:									
Australia	0					5	48.3		1.5
Burma	50,000	54	3.40	291,600	1	1	2.0		
Formosa	0					1	15.0	2.0	
India	30,000	660	6.30	49,300	3	1	5.8	1.5	
Indonesia-New Guinea-Borneo	2,450,000	2,230	313.24	1,630,927	20	6	259.6	59.5	
Japan	28,000	3,572	5.84	91,955	44	13	125.1	8.3	
Pakistan	25,000	28	4.33	15,579	3	1	4.0		
Total	2,583,000	6,544	333.11	2,079,361	71	28	459.8	71.3	1.5
Total world excl. Russia & controlled areas	125,518,500	509,089	11,963.33	67,500,837	6,021	575	14,252.6	3,938.5	3,651.6
Russia and controlled areas	†9,740,000		1,170.30	9,248,800		87	1,246.1	339.5	50.0
Total world	135,258,500	509,089	13,133.63	76,749,637	6,021	662	15,498.7	4,278.0	3,701.6

*Total for January 1, 1953, as given in The Oil and Gas Journal's 1953 Annual Review and Forecast Issue; 1954 figures will be included in the next Review and Forecast Issue, January 25, 1954.

†Includes U.S.S.R. (9,000,000,000) and Communist controlled countries comprising Austria (200,000,000), Romania (400,000,000), Hungary (55,000,000), Albania, China, Czechoslovakia, Poland, and Yugoslavia.

World Output Up 5 Per Cent, 555,000 Bbl.

by Dahl M. Duff
International Editor

THE increase in world production of crude oil held at a more modest rate in 1953 for the second successive year.

Total world output, exclusive of the Communist countries, gained 5 per cent. This percentage increase was a slight improvement over the previous year, but considerably below the 12 and 13 per cent gains in 1950 and 1951 when demand was suddenly accelerated by the Korean war and stepped up industrial activity.

Though the increase of 5 per cent in Free World production may seem small compared with the gains of a few years ago, volumetrically it called for the addition of more than 555,000 bbl. daily to crude-oil supply in 1953. World production is now at such a tremendous rate compared to the prewar years that what might be called a normal percentage increase represents nearly as much oil as, for example, the entire output of Iraq.

Following the pattern of the postwar years, foreign production in 1953 expanded at considerably greater rate than the United States. The 3.1 per cent increase in United States production compares with a gain of 7.3 per cent in non-Communist foreign production. Over the last 5 years, the average annual increase in United States production has amounted to 3.4 per cent, while foreign output has shown an average annual gain of 11.4 per cent during the same period.

Here are the percentage gains in production:

Year—	Free World total	United States	Non-Communist foreign
1953	5.0	3.1	7.3
1952	4.1	1.8	7.1
1951	13.0	13.8	11.9
1950	12.0	6.8	19.1
1949	—1.3	—8.4	11.6
1948	13.2	8.4	22.5
1947	9.8	7.1	15.5

The proportion of United States production to the world total again declined in 1953. United States output made up 49.7 per cent of the world

(Continued on page 250)

WORLD'S OIL . . . WHERE AND HOW MUCH

(In thousands of barrels daily)

Country—	1953	1952	% Diff.	1951	1950
Western Hemisphere:					
Argentina	77.2	67.8	13.9	66.0	64.0
Bolivia	1.4	1.4		1.4	1.6
Brazil	2.7	2.0	35.0	1.9	0.8
Canada	223.0	167.2	33.4	130.4	78.4
Chile	3.3	2.4	37.5	1.8	1.6
Colombia	108.2	105.8	2.3	105.7	93.1
Cuba	0.1	0.1		0.2	0.3
Ecuador	8.1	7.7	5.2	7.6	7.4
Mexico	199.0	210.6	—5.4	211.2	197.6
Peru	44.0	44.8	—1.8	44.1	41.2
Trinidad	61.1	58.1	5.2	57.1	56.0
Venezuela	1,745.0	1,803.9	—3.4	1,704.6	1,498.0
Total	2,473.1	2,471.8	0.1	2,332.0	2,040.0
Europe and Africa:					
Algeria	1.7	0.8	112.5	0.3	0.1
France	7.1	6.6	7.6	5.4	2.4
French Morocco	2.1	2.1		1.5	0.8
Western Germany	41.7	34.0	22.7	26.5	21.0
Italy	1.9	1.4	35.8	0.4	0.2
Netherlands	15.6	13.6	14.7	13.6	13.4
Egypt	46.7	44.9	4.0	44.6	44.5
United Kingdom	1.1	1.1		0.9	0.9
Total	117.9	104.5	12.8	93.2	83.3
Middle East:					
Bahrein	30.1	30.1		30.1	30.2
Iran	28.0	27.7	1.1	350.4	665.4
Iraq	570.0	385.1	48.0	176.3	136.2
Kuwait	850.0	747.1	13.8	561.4	355.0
Qatar	79.8	68.8	16.0	48.8	34.1
Saudi Arabia	845.0	824.8	2.5	761.5	546.7
Turkey	0.5	0.4	25.0	0.3	0.3
Total	2,403.4	2,084.0	15.3	1,928.8	1,767.9
Other Asia:					
British Borneo	101.0	104.5	3.4	102.7	84.8
Burma	3.2	2.4	33.3	2.0	1.0
India	6.3	5.7	10.5	5.3	5.0
Indonesia	201.5	171.0	17.9	151.7	141.0
Japan	5.7	5.7		6.4	5.6
New Guinea	4.9	4.7	4.3	4.8	4.8
Pakistan	3.8	3.8		3.2	3.3
Total	326.4	297.8	9.6	276.1	245.5
Total foreign less Russia and other Communist areas	5,320.8	4,958.1	7.3	4,630.1	4,136.7
United States	6,455.0	6,262.3	3.1	6,149.4	5,402.3
Total Free World	11,775.8	11,220.4	5.0	10,779.5	9,539.0
Estimated Russia and other Communist Areas:					
Austria	62.5	55.0	13.7	42.0	34.0
Romania	90.0	85.0	5.9	85.0	85.0
Russia	1,040.0	935.0	11.2	842.0	754.0
Other Com. Areas†	32.0	25.2	25.9	24.9	25.3
Total	1,224.5	1,100.2		993.9	898.3
Total World	13,000.3	12,320.6	5.5	11,773.4	10,437.3

*Pakistan included in India prior to 1947. †Albania, China, Czechoslovakia, Hungary, Poland, and Yugoslavia.

World-Wide OIL Report

. . . an appraisal of today's situation outside the United States

MIDDLE EAST AND EASTERN MEDITERRANEAN . . .

BAHRAIN

Area, sq. miles	**231**	**Ref. cap., B/D**	**205,000**
Population	**110,000**	**Prod., B/D**	**30,000**
Capital	**Manama**	**No. of fields**	**1**
Currency	**Indian rupee**	**No. of wells**	**80**
Value	**$0.212**	**Reserves, bbl.**	**280,000,000**

BAHRAIN, an island 20 miles off the coast of Saudi Arabia, is the site of a single oil field, relatively small by Middle East standards, and one of the largest refineries in the Eastern Hemisphere. The operating company is Bahrain Petroleum Co., Ltd., a part of the Caltex Group and owned by Standard Oil Co. of California and The Texas Co. (the name of the company has been changed from Bahrein to Bahrain to conform to the preferred spelling for Bahrain Island).

The field has a settled production of about 30,000 bbl. daily. The Cretaceous Bahrain Zone was discovered in 1932, and the Fourth Pay, a Jurassic limestone producing lighter crude, was found 4 years later. Deep drilling after war and offshore marine exploration failed to develop new production, and field operations are now confined to development drilling and workovers. The company had seven wells projected for this year.

Successive expansions have brought the Bahrain refinery to its present capacity. It was built in 1936 for 10,000 bbl. daily, and in 1940 had a capacity of 35,000 bbl. daily. Military needs during the war and, in 1951, the shutdown at Abadan gave added importance to the refinery. It processes the Bahrain production but most of the charge consists of Saudi Arabian crude oil which is moved through a recently looped submarine pipe line from the Saudi Arabian mainland. Bahrain, a British protectorate, serves as a commercial and trading center for this part of the Middle East.

BAHRAIN PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Bahrain	1932	2,200	78		6	1	29,540	146,281,230	35	Cretaceous ls.
Fourth pay	1936	4,500	2		1		460	2,070,591	36.5	Jurassic ls.
Total Bahrain					7	1	30,000	148,351,821		

(1) Corrected to 7-1-'53.

BAHRAIN REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
The Bahrain Petroleum Co., Ltd., Awali, Bahrain Persian Gulf	Bahrain	S-C-A	205,000	(1)35,200	26,000

(1) Thermal cracking, 15,700 bbl. daily and 19,500 bbl. daily of thermal reforming.

IRAN

Area, sq. miles	630,000	Cap. now running (approx)	50,000
Population	19,559,000	Prod., B/D	23,740
Capital	Teheran	No. of fields	8
Currency	Rial	No. of wells	42
Value	$0.032	Reserves, bbl.	15,000,000,000
Ref. cap., B/D	502,500		

THE international oil industry, which 2 years ago was worrying how to do without Iran, is now worrying about what to do with it. This new turn in the situation came as a result of the uprising in August which deposed the emotional, British-hating Prime Minister Mossadegh who instigated the Anglo-Iranian Oil Co., Ltd., nationalization and subsequently turned down a half a dozen tempting British and American proposals for settlement.

The prospects of settlement which arose with the inauguration of the more moderate regime of Gen. Fazollah Zahedi raised serious problems for the industry. Most immediate was the difficulty of fitting Iranian oil back into an altered pattern of trade from which it had been completely eliminated. Few in the industry expected that world markets could absorb more than a small part of the output of the 500,000 bbl. daily refinery at Abadan. The industry faced a substantial task even in finding outlets for much of Iran's potential crude production, which on the basis of Anglo-Iranian's best performance is in excess of 700,000 bbl. daily.

Since the Iranian properties were shut down and the British expelled from the concession, accelerated refinery construction in many parts of the Eastern Hemisphere has provided supplies for markets once served by Abadan. Much of the refinery buildup has already been completed in Europe, and over the next 2 or 3 years, several hundred thousand barrels daily of capacity will come into operation in new plants located in countries bordering the Indian Ocean and in Australia. Similarly, crude production has been stepped up to replace Iran's former output, and in this reorientation of oil flow, Kuwait, Iraq, and Saudi Arabia have been the principal beneficiaries. Surplus conditions now characterize the crude-oil market both in the Eastern and Western Hemispheres. There has been talk that Iran's production could take up the annual growth in Free World consumption. However, this assumes a static production elsewhere and, moreover, the rate of increase in consumption has declined appreciably in the last year or two.

The terms of whatever settlement is made with Iran threatened serious repercussions in other oil-producing countries. Whatever is favorable to Iran could be interpreted as encouragement for nationalization, even though Britain has stood firm on its demand for compensation for the properties, including losses from the breach of the concession contract some 40 years before its normal expiration date. Another problem is the degree of participation of the British in whatever type of Iranian oil operation is finally agreed on. There has been sentiment in Britain that the Iranian oil industry, founded and developed by British enterprise and capital, should not now pass wholly into American hands.

Adjustment Was Swift

For the first 2 years after the oil industry was taken over, the Iranian Government and the public clung to a hopeful optimism about the outcome. The apparent ease with which the Iranian oil was replaced in world markets and the failure to the British and Americans to come to terms, even under constant threat of the Communist menace, were disappointing. A month after the Zahedi regime came to power, a statement was issued in Iran which emphasized the difficulties the country faced. The new prime minister acknowledged it is necessary for Iran to sell its oil on the world market as soon as possible. Although the properties are in a state of virtual idleness, the National Iranian Oil Co. was said still to have more than 56,000 persons on its payroll, only 5,000 fewer than Anglo-Iranian, and to be running into debt at a rate equivalent to about $3,700,000 a month.

National Iranian Oil Co. this year has been producing 50,000 to 75,000 bbl. daily, but roughly between a third and a half of this output has been recycled back to the producing formations. It is presumed the company is using the crude produced to continue operations in one unit at Abadan and to replenish crude storage following export sales. Products, both fuel oil and the lighter fractions, which are not needed to refill storage, are returned to Masjid-i-Sulaiman field and injected into the

IRAN PRODUCTION

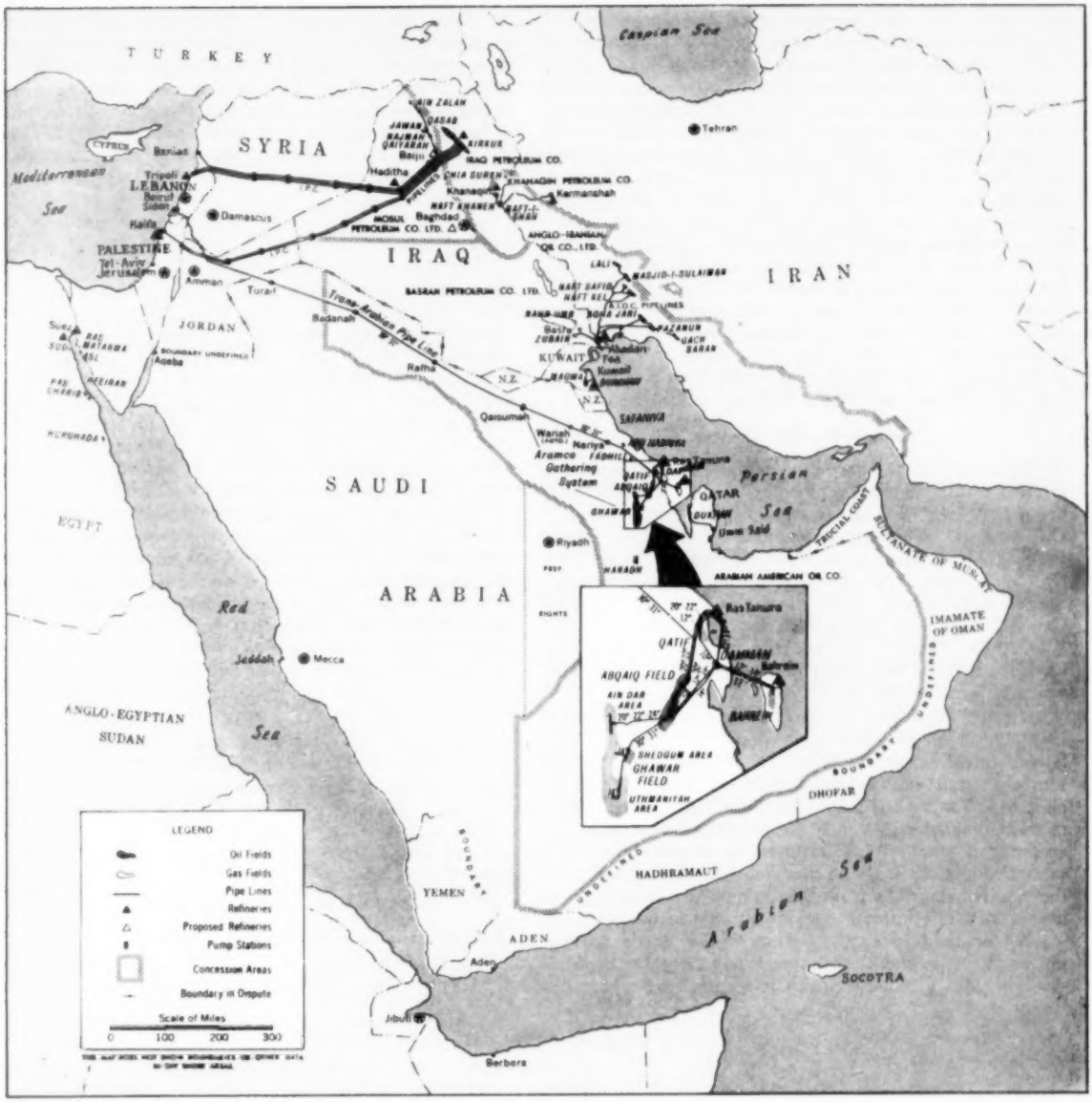
Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data or prod. formation
Aga Jari	1937	4,870							35	Olig., Mio. ls.
Gach Saran	1928	800							32	Olig., Mio. ls.
Haft Kel	1928	1,700							38	Olig., Mio. ls.
Lali	1938	4,500							36	Olig., Mio. ls.
Masjid-i-Sulaiman	1908	1,270							38	Olig., Mio. ls.
Naft-i-Shah	1923	1,940							42	Olig., Mio. ls.
Naft-Safid	1934	4,460							36	
Pazanun	1937									
Total Iran[1]			42		96		23,740	2,663,200,000		

(1) Estimated.

IRAN REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Anglo-Iranian Oil Co., Ltd., Britannic House, Finsbury Circus, London E. C. 2, England	Abadan[2]	Comp.	300,000	75,000	25,000
Kermanshah Petroleum Co., Ltd., Britannic House, Finsbury Circus, London E. C. 2, England	Kermanshah[3]	S	2,500		
Total Iran			302,500	75,000	25,000

(1) In May 1951, oil industry in Iran was nationalized. (2) Refinery not now being operated by Anglo-Iranian Oil Co., Ltd. (3) Refinery not now being operated by Kermanshah Petroleum Co., Ltd.



Middle East . . . Not a question now of what to do without Iran, but what to do with it.

reservoir. About 10,000,000 bbl. of products was left in storage at Abadan when Anglo-Iranian withdrew. N.I.O.C. has been circulating newly produced products into the tanks as possible when withdrawals are made for export and Iranian domestic consumption.

Since the nationalization, Iran through October had sold about 561,000 bbl. of products and 358,000 bbl. of crude. This was in 11 shipments to 3 companies, 2 of them in Italy and 1—Idemitsu—in Japan. The Japanese movement was throttled off toward the end of the year after the Japanese Government withheld further foreign exchange to continue the controversial trade. The oil imported into Italy was reported to be tied up in dock storage because of the Italian Government's refusal to grant import licenses.

IRAQ

Area, sq. miles	**168,040**	**Ref. cap., B/D**	**9,500**
Population	**5,100,000**	**Prod., B/D**	**669,000**
Capital	**Baghdad**	**No. of fields**	**4**
Currency	**Dinar**	**No. of wells**	**76**
Value	**$2.82**	**Reserves, bbl.**	**13,000,000,000**

IRAQ is the third-largest producing country in the Middle East. Its present output of nearly 600,000 bbl. daily was achieved mainly as a result of the construction of a new 30 and 32-in. pipe line to Banias, Syria, in

1951 and 1952. Unlike other major Middle East fields, Iraq's principal producing area, Kirkuk, is located at considerable distance from the seacoast, and its level of production is entirely dependent on what can be moved through long-distance lines to the Eastern Mediterranean.

There are four companies operating in Iraq, all having production. About 85 per cent of the country's output comes from Kirkuk field where the operating company is Iraq Petroleum Co., Ltd. Most of the country is held under concession by I.P.C. and its two affiliated companies, Basrah Petroleum Co., Ltd., which operates Zubair field in the south, and Mosul Petroleum Co., Ltd., producing Zin Zalah field near the Turkish border in the northern part of the country. Khanaquin Oil Co., wholly owned by Anglo-Iranian Oil Co., Ltd., produces Naft Khaneh field on a small concession in eastern Iraq. This area was at one time part of Iran and was included in Iraq in a border adjustment.

Internationally Owned

I.P.C. and its affiliated companies are owned by a group of international companies, 23.75 per cent each being held by (1) Anglo-Iranian, (2) Shell, (3) Standard Oil Co. (N. J.) and Socony-Vacuum Oil Co., Inc., (4) the French Cie. Francaise des Petroles, and (5) 5 per cent by C. S. Gulbenkian who figured in the original concession negotiations. I.P.C., once the Turkish Petroleum Co., has a colorful history reaching back before the first World War. The former German interest was redistributed, and American participation agreed on following years of negotiations in the 20's.

Kirkuk, discovered in the famous Baba Gugur gusher in 1927, is an anticline more than 60 miles long and having three subsurface domes. Only one, Baba on the southeast end, was produced until the heavy withdrawals called for by the new pipe line. The company has recently opened up Avanah dome in the center, and separator and stabilization facilities at Kirkuk have been expanded for the higher producing level from Baba and the additional crude from Avanah. The northwest and lowest dome, Khurmala, is mostly gas.

Zubair field in southern Iraq was a major postwar discovery. It is the deepest producing field in the Middle East, taking crude from a Cretaceous sandstone called the Third Pay at around 11,000 ft. The field went into production the latter part of 1951 with the completion of a pipe line to a new tanker terminal on the Shatt-el-Arab River at Fao. This fall, a new 24-in. line was finished from Zubair to Fao, and production is expected to be gradually stepped up from the present 60,000-65,000 bbl. daily to about 160,000 bbl. daily over the next 2 years. Development of the deep Zubair production is expensive and slow.

Present refining facilities in Iraq consist mostly of the Alwand refinery serving Naft Khaneh field and a small topping plant at Basrah operating on Zubair crude. Both these plants are government owned. The Alwand refinery was turned over to the Iraq Government in 1951 under an agreement whereby the Anglo-Iranian subsidiary, Khanaquin Oil Co., continues as operator. In addition to these facilities, the Iraq Government has under construction a major refinery at Baghdad, a 25,000-bbl.-daily plant designed to meet domestic requirements. It will operate on I.P.C. crude which the company in its 1951 profit-sharing agreement agreed to furnish the government at a charge of about 10 cents a barrel.

The large income received by Iraq from its oil operations is being used for a number of major improvement projects. By law, most of the money is assigned to the Iraq Development Board and used on capital projects. Oil offers Iraq an opportunity to regain some of the influence and prosperity it has not known since ancient times.

ISRAEL

Area, sq. miles	**7,951**	**Currency**	**Pound**
Population	**1,430,000**	**Value**	**$2.81**
Capital	**Jerusalem**	**Ref. cap., B/D**	**86,000**

ACTIVE drilling programs were started this fall by several companies in Israel on acreage granted under terms of the country's 1952 petroleum law. The half

IRAQ PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data or prod. formation
Kirkuk	1927	2,750	38	0	7	0	490,000	729,812,000	35.2	Mid-Eocene ls.
Ain Zalah	1939	5,500	3	0	6	1	27,000	7,264,000	32.1	Cretaceous ls.
Zubair	1949	11,000	13	0	13	5	61,000	28,872,000	34.3	Cretaceous ss.
Qatar	1940	6,000	22	0	7	1	91,000	71,909,000	40.4	Jurassic ls.
Total Iraq			76	0		7	669,000	837,857,000		

IRAQ REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Iraq Petroleum Co., Ltd., 214 Oxford St., Oxford Circus, London W. 1, England	Baba Gurgur	S	1,500		
Iraq Government	Alwand (1)	S	8,000		
	Baghdad		(2)		
Total Iraq			9,500		

(1) Formerly operated by Khanquin Oil Co., Ltd. (2) New 25,000-bbl. per day refinery under construction.

ISRAEL REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Consolidated Refineries, Ltd., Britannic House, Finsbury Circus, London E. C. 2, England	Haifa	S-C	86,000	43,000	

(1) Includes cracking, reforming and visbreaking. Plant operating part time.

dozen different companies and groups holding exploration licenses are all independent concerns representing Jewish, United States, and Canadian capital. None of the major international companies have shown any interest in Israel exploration. Besides geological considerations, these companies have tremendous investments in the Arab producing countries which are still in a state of war with Israel.

Among the more active participants in the search for oil in Israel are Lapidoth-Israel Petroleum Co., New Continental Oil Co. of Canada, and Husky Oil Co. Lapidoth-Israel is financed by American Palestine Trading Corp. and Mekoroth, the Israel water-works company, each of which advanced $2,500,000 for the venture. Lapidoth-Israel engaged Kerr-McGee Oil Industries as drilling contractor for testing on the approximately 500,000 acres which it holds. First drilling was slated in the Dead Sea area where Lapidoth-Israel holds licenses jointly with Israel Oil Prospectors, Ltd.

New Continental, a Canadian company, which took rights on some 700,000 acres, made arrangements with Pontiac Petroleum, Ltd., under which the latter firm will act as drilling contractor and be the operator in the undertaking. Husky, holding approximately 400,000 acres, was carrying out geophysical survey work during the fall. Some assistance is being given the companies by the Weizmann Institute of Science. Latest entrants in Israel exploration were two companies, Pan Israel Oil Co., Inc., and Israel Oil Licenses, Inc., both headed by William F. Buckley who is identified with the Pantepec-Pancoastal organization.

The Israel oil law, which became effective August 31, 1952, and the regulations subsequently promulgated are designed to encourage foreign capital into the country. The favorable terms of the law indicate an awareness on the part of the Israelis of their country's urgent need for capital and the development of whatever natural resources can be discovered. Thirty-year leases, renewable for 20 years, are provided, along with one-eighth royalty. The law was drafted with the advice of Max Ball, United States consultant.

Ball studied the country and reported that the Negev, the Dead Sea area, the Judea foothills, and the coastal plain are the most promising. The only parts of the country with Tertiary cover are the coastal plain and the Jordan-Dead Sea-Araba rift valley. The only well drilled in Israel in recent years was the 1947-48 test of an Iraq Petroleum Co., Ltd., subsidiary near Gaza which was never completed because of the war. The drilling campaign now beginning promises a thorough assessment of the prospects of this eastern Mediterranean country.

The single refinery in Israel is the Haifa plant of Consolidated Oil Refineries, Ltd., jointly owned by Anglo-Iranian and Shell and operated by Anglo-Iranian. This refinery has a capacity of 86,000 bbl. daily and 6 years ago was an important export plant and source of supply for Europe. In 1948 because of the Jewish-Arab strife, the Iraq Government refused to allow further movement of crude to the refinery through the 12-in. line from Kirkuk field, and the plant shut down. It was reopened in 1950 and has since been running on crude brought by tanker. Throughput is about 20,000 bbl. daily, sufficient for internal demand.

KUWAIT

Area, sq. miles	**8,000**	**Ref. cap., B/D**	**30,000**
Population	**200,000**	**Prod., B/D**	**844,720**
Capital	**Kuwait**	**No. of fields**	**4**
Currency	**Indian rupee**	**No. of wells**	**138**
Value	**$0.212**	**Reserves, bbl.**	**20,000,000,000**

KUWAIT is what might be called an oil man's dream. The great Burgan field, which along with Ghawar in Saudi Arabia ranks as the world's largest, was found after the drilling of only one dry hole. The wells are relatively shallow, and production from the four sands runs from 5,000 to 9,000 bbl. daily per well. There is an active and effective water drive. The field lies close to the coast, and only short lines are necessary to carry the crude to the tanker terminal.

Kuwait Oil Co., Ltd., owned 50-50 by Gulf Oil Corp. and Anglo-Iranian Oil Co., Ltd., is the operating company. In several months during the past year, production from Kuwait moved up to exceed Saudi Arabia and rate the shaikhdom as the world's fourth largest oil-producing country, after the United States, Venezuela, and Russia.

The facilities in Kuwait were considered ample for anticipated withdrawals, roughly half a million barrels daily, when the Iranian nationalization suddenly broke on the industry in 1951. A large part of the task of replacing Iran's output fell to Kuwait since Anglo-Iranian operated in both countries. The further buildup in facilities since then has given Kuwait a producing capacity estimated at well above 1,000,000 bbl. daily.

Of particular interest is the exploratory work undertaken by K.O.C. with the drilling of the Magwa well

KUWAIT PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data or prod. formation
Ahmadi Ridge	1952	3,500-4,800	1						31.6	Mid. Cret. ss.
Burgan	1938	3,500-4,800	126		[5]				31.6	Mid. Cret. ss.
Magwa	1952	3,500-4,800	11		[7]	2			31.6	Mid. Cret. ss.
Wafra[3]	1953	3,640			1	1			25	Cret. sand
Total Kuwait			138		13	3	[4]844,718	[4]914,747,396		

(1) Includes 4 observation wells. (2) Includes 6 wells awaiting completion of gathering facilities and 1 observation well. (3) Kuwait-Saudi Arabia neutral zone. (4) Total for Ahmadi Ridge, Burgan and Magwa fields.

KUWAIT REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Kuwait Oil Co., Ltd., 1 Gt. Cumberland Place, London W. 1, England	Mina-al-Ahmadi	S	30,000		

the latter part of 1951. This resulted in a field discovery 9 miles north of Burgan. Then early this year, the company brought in the second wildcat drilled since the Burgan discovery in 1937. This was the Ahmadi well, 4½ miles northeast of Burgan and just south of the tank farm. The successful Ahmadi well preserved the Kuwait record of having drilled only one dry hole, the original test in 1934. (This excepts the deep test drilled in the center of Burgan field to 13,853 ft. several years ago. It failed in the deeper formations but was completed later in the regular Burgan sands.)

Simple Producing Operation

Kuwait is a compact and relatively simple producing operation. The wells are flowed into multistage separator stations, each of about 120,000 bbl. daily capacity. The oil then moves to the central tank farm on Ahmadi ridge near the main company town. From these, it is taken by gravity flow down a set of pipe lines several miles to the tanker loading berths. This summer, to augment the gravity flow system from Ahmadi ridge, K.O.C. laid a new 34-in. line, the world's largest in crude-oil service.

Two years ago the two parent companies in Kuwait worked out a 50-50 profit-sharing agreement with the shaikh of Kuwait. The small state, a British protectorate which has a total population of about 200,000 persons, now receives an annual income estimated at approximately $165,000,000. As a result, the Kuwaitis have been termed the world's luckiest people. Extensive public works and improvement projects are under way to raise the standard of living of these people whose income once came mostly from camel herds, boat building, and pearl diving. The Kuwait Government has built a large seawater distillation plant to provide fresh water that formerly had to be entirely imported. A technical college is under construction. Schools, a hospital, and housing are among the other projects now rising in Kuwait as a result of its oil wealth. Plans are being studied for a large pipe line to bring fresh water to Kuwait from the Shatt-el-Arab River in Iraq.

NEUTRAL ZONE

Area, sq. miles	**2,000**	**Reserves, bbl.**	**300,000,000**

A SMALL wedge-shaped piece of territory on the Persian Gulf between Saudi Arabia and Kuwait was added to the list of producing areas of the Middle East in 1953. It is the Neutral Zone which is held jointly by the adjacent two countries. About 5 years ago, American Independent Oil Co. obtained rights from the shaikh of Kuwait covering his undivided half interest in the zone, and Pacific Western Oil Co. acquired a similar concession from the king of Saudi Arabia.

Many geologists considered the Neutral Zone a No. 1 prospect, located as it is only a short distance south of Kuwait's great Burgan field, and it was predicted that the concessionaires would quickly establish major production. However, exploration which began in 1949 was carried out without success until last spring when the sixth well to be drilled came in as a producer. The five dry holes and the 3 years of work cost the companies in excess of $30,000,000.

The new discovery was made in the fourth well to be drilled on the Wafra structure. It was the first production in the Middle East by so-called independent companies, that is, other than the major international oil companies. The discovery and the first two field wells completed had a total productive capacity of about 8,000 bbl. daily in contrast to the more normal 5,000 to 10,000 bbl. daily per well output in many other Persian Gulf fields. The crude was heavier—25° gravity as compared to 31°-32° in Kuwait and 34°-35° in Saudi Arabia.

Aminoil, as American Independent is known, is the operator for both concession holders. An aggressive development program was instituted following completion of the first two wells. A second rig was brought in, and plans called for completing eight more wells during the second half of 1953. Export shipments were scheduled to begin late in 1953 through a 35-mile, 8 and 10-in. pipe line under construction to an offshore loading point on the Persian Gulf.

QATAR

Area, sq. miles	**5,000**	**Value**	**$0.212**
Population, est.	**25,000**	**Prod., B/D**	**78,610**
Capital	**Dohah**	**No. of fields**	**1**
Currency	**Indian rupee**	**No. of wells**	**15**
	Reserves, bbl.	**1,500,000,000**	

PRODUCTION in the shaikhdom of Qatar, which has been gradually increased to its present rate of about 100,000 bbl. daily, comes from Dukhan field on the western side of the peninsula. The operating company is Petroleum Development (Qatar), Ltd. The second company operating in Qatar is Shell Overseas Exploration Co., Ltd., which is doing exploratory work in submerged offshore areas generally beyond the 3-mile limit.

The Dukhan anticline was mapped in 1937-38 and the discovery well brought in at the beginning of 1940. The Zekrit formations from which production is obtained correlates with the middle Jurassic producing strata in Saudi Arabia. The three wells drilled prewar were plugged and the equipment removed, and work was not resumed until 1947. Commercial production of oil commenced in December 1949 after separator facilities were built and a 73-mile, 14-in. pipe line laid across the peninsula to a tanker-loading terminal on the east coast at Umm Said.

Production comes from the Nos. 3 and 4 limestones. Of the 32 wells drilled since the war, 10 were completed

QATAR PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data on prod. formation
Dukhan[1]	1940	6,000	15		9	2	78,610	71,770,000	39	Jurassic ls.

(1) Estimated.

in the No. 3 formation and 17 in the No. 4. There are three oil-water and one gas-observation wells. Of the total production, about three-quarters is from the No. 4 limestone which produces 43°-gravity crude. The crude from No. 3 is 39° gravity and undersaturated. Present proved extent of the field is over an area of about 30 miles in length and 3 miles in width. Average depth for a No. 3 well is 6,000 ft., and for a No. 4 well, 6,800 ft.

The I.P.C. organization has built up a modern oil town at Dukhan. There are extensive workshops, warehouses, and communications facilities as well as residential quarters for the staff and labor force. The main separator station is at Katiyah where degassing is accomplished in four stages. A larger-diameter pipe line to Umm Said is planned. In November 1952, the company commenced a wildcat, the Kharib well, east of the field toward the middle of the peninsula. It was reported to have had gas shows in the Cretaceous but found water in the Jurassic. The concession held by I.P.C. in Qatar was renegotiated last year, and the government's income placed on a 50-50 participation basis, instead of the previous royalty of approximately 27 cents a barrel.

The Shell subsidiary took the marine concession formerly held by International Marine Oil Co., Ltd., a company controlled by Superior Oil Co. Superior relinquished the concession, along with one held on the Trucial Coast, after carrying out some geophysical work. Shell has embarked on a full-fledged exploration program. A former merchant vessel was converted into a special marine exploration ship and sent to the Persian Gulf this fall. Terms of the Shell concession include a drilling obligation within 2 years but this may be delayed another 2 years with a penalty payment. If the exploration is successful, production will be under a 50-50 arrangement with the shaikh.

SAUDI ARABIA

Area, sq. miles	**415,000**	**Ref. cap., B/D**	**189,000**
Population	**6,000,000**	**Prod., B/D**	**834,520**
Capital	**Riyadh**	**No. of fields**	**10**
Currency	**Riyal**	**No. of wells**	**138**
Value	**$0.2725**	**Reserves, bbl.**	**28,000,000,000**

SAUDI ARABIA has retained its rank as the world's fourth largest oil producing country, although now by only a narrow margin over neighboring Kuwait. Operations are entirely in the hands of Arabian American Oil Co. which is owned 30 per cent each by Standard Oil Co. of California, The Texas Co., Standard Oil Co. (N. J.), and 10 per cent by Socony-Vacuum Oil Co., Inc. Saudi Arabia is the only country in the Middle East where Americans are employed in large numbers.

The original Saudi Arabian oil concession was obtained by Standard Oil Co. of California. The first nine wells were drilled on the Dammam dome and failed to find production in the Middle Cretaceous which is productive on nearby Bahrain. The discovery of the prolific Jurassic Araz zone production came in 1938 in deepened drilling at Dammam.

The company now has 10 separate fields, all of them productive in the Jurassic except the offshore Safaniya, a Cretaceous sand discovery and the only field in the Persian Gulf. Three fields, Ain Dar, Uthmaniyah, and Shedgum, are definitely interconnected and are collectively called Ghawar, a name taken from the local pasturage area. Ghawar is one of the world's greatest oil accumulations, having a north-south length of approximately 70 miles. The Ain Dar section is now almost completely drilled. This area of Ghawar has three separator stations, each of the standard Aramco 100,000-bbl.-daily design. Uthmaniyah was brought on commercial production early this year following the completion of the first separator station in this area. Crude from Uthmaniyah is moved through a 30-31-in. line to the main Aramco system at Abqaiq. Separator facilities are being built in Shedgum.

Abqaiq Being Cut Back

Abqaiq, which formerly supplied the bulk of Aramco's production, is gradually being cut back in favor of greater withdrawals from the Ghawar areas. A repressuring project designed to return 150,000,000 cu. ft. of gas daily to the formation was scheduled to go into operation late this year. The main Aramco stabilization plant is situated at Abqaiq. Crude loaded offshore at Ras Tanura or moved into the Tapline system to the Eastern Mediterranean is treated in the stabilization plant.

The Ras Tanura refinery was built during the war with an initial capacity of 50,000 bbl. daily, but later bottleneck removal resulted in a throughput two or three times this figure. Last year several improvements were made at the plant, including new topping and catalytic polymerization units, and the refinery processed nearly 240,000 bbl. daily during 1 month's period this year.

Headquarters of Aramco's operations in Eastern Saudi Arabia are at Dhahran, which has been built into a modern American community. Aramco has some 25,000

SAUDI ARABIA PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl: Daily	Accum.	Gravity, A.P.I.	Geological data on prod. formation
Abqaiq	1941	6,800	55		8		293,474	874,863,647	36	Jur., Det.-dolo. ls.
Abu Hadriyah	1940	10,115						9,579	36	Jur., Det.-dolo. ls.
Dammam	1936	4,850	24		3		62,603	285,833,435	35	Jur., Det.-dolo. ls.
Fadhili	1949	9,850							38	Jur., Det.-dolo. ls.
Ghawar-Ain Dar	1948	7,125	42		1	1	349,815	230,793,611	35	Jur., Det.-dolo. ls.
Ghawar-Shedgum	1952	7,125				1			35	Jur., Det.-dolo. ls.
Ghawar-Uthmaniyah	1951	7,125	8			3	94,433	17,092,433	35	Jur., Det.-dolo. ls.
Haradh	1949	6,550							34	Jur., Det.-dolo. ls.
Qatif	1945	7,350	9				34,198	40,885,855	35	Jur., Det.-dolo. ls.
Safaniya	1951	5,560				1			27	Cretaceous ss.
Total Saudi Arabia			138		12	6	834,523	1,449,478,560		

SAUDI ARABIA REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Arabian American Oil Co., Dhahran	Ras Tanura	S-C	189,000		26,000

(1) Planned for 1955, 12,500 cat cracker.

employes, including about 15,000 Saudi Arabs and more than 4,000 Americans.

In 1950 Aramco signed the first 50-50 profit-sharing agreement governing oil operations in the Middle East. This has resulted in an annual income estimated to be approximately $200,000,000 for the Saudi Arabian Government. Revisions of the agreement which would add further to Saudi Arabia's revenue were asked by the government, and negotiations have been conducted intermittently over the last year. It is expected that the government will share in the income from the 22-cent-higher crude-oil price instituted in the Middle East this summer, and receive other additional benefits.

SOUTH ARABIAN TERRITORIES

ADEN

Area, sq. miles	80	Currency	Shilling
Population	100,000	Value	$0.1413

SEVERAL petroleum developments of interest have recently taken place in the separate states which lie across the southern side of the Arabian Peninsula. In the British colony of Aden, Anglo-Iranian Oil Co., Ltd., is building the largest complete new refinery ever constructed. This 120,000-bbl.-daily project arose out of the need to replace facilities lost in the nationalization in Iran. Aden is an important bunkering station and is strategically located to supply large East-of-Suez markets. Middle East Bechtel and the British firm, George Wimpey & Co., have the contract for the project which estimated to cost between $112,000,000 and $140,000,000. Construction of the refinery is entailing the building of a complete new town and extensive harbor facilities.

YEMEN

Area, sq. miles	75,000	Capital	Sana
Population	4,500,000	Currency	Riyal
	Value	$0.2725	

Elsewhere throughout the southern part of Arabia, exploratory work is under way. To the north of Aden, in the ancient kingdom of Yemen, the German producing company, C. Deilmann Bergbau, G.m.b.H., is participating with the government in an effort to find oil. The Deilmann contract signed early this year differs from the normal concession agreement in that the company and the government participate in both expenses and profits in a 25-75 per cent ratio, respectively. The agreement provides for a 5-year exploratory period and a 20-year joint exploitation period if oil is found. Yemen has actively been seeking foreign assistance in oil exploration for several years.

SULTANATE OF MUSCAT AND OMAN

Area, sq. miles	82,000	Capital	Muscat
Population	550,000	Currency	Indian rupee
	Value	$0.212	

Cities Service Co. and Richfield Oil Corp. took an option this year on a concession over about 30,000 sq. miles in the Province of Dhofar in the Sultanate of Muscat and Oman. The concession was originally held by the Philpryor Corp. representing Wendell Phillips and Sam Pryor. Cities Service and Richfield are doing surface geological work in the area. The Dhofar concession was relinquished by Iraq Petroleum Co., Ltd., about 2 years ago.

I.P.C. is continuing its wildcatting program on the Trucial Coast. The company's third test currently being drilled is at Murban in the shaikhdom of Abu Dhabi where the Ras Sadr well was drilled to 13,001 ft. in 1950-51. Last year I.P.C. drilled a 12,353-ft. dry hole at Jebel Ali in Dubai.

TURKEY

Area, sq. miles	296,185	Ref. cap., B/D	1,400
Population	21,983,000	Prod., B/D	420
Capital	Ankara	No. of fields	2
Currency	Pound	No. of wells	3
Value	$0.3575	Reserves, bbl.	80,000,000

TURKEY promises to become one of the most active areas of oil exploration in the Eastern Hemisphere. Nearly a half-dozen large companies are now doing geological field work in the expectation of carrying out full-fledged programs later.

As a result of a law passed in 1926, oil activities in Turkey, aside from marketing, have been handled exclusively by the government's M.T.A., or Mineral Research and Exploration Institute. The 1926 law nationalized the subsoil, and while not prohibiting foreign companies, it so limited the size of exploration acreage that no private operator was interested. Since it began work in the early thirties, the M.T.A. Institute has found two fields in the southeastern part of the country, but lack of capital and other problems have prevented their full development.

Sentiment for a change in the government attitude toward private foreign capital began to build up in 1951. A law enacted in August of that year opened the door to foreign investments generally, providing for repatriation of profits and original capital. Then, on November 22, 1952, a decree of the Council of Ministers declared the government's intention to seek foreign capital in the search for and development of whatever oil resources the

TURKEY PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data or prod. formation
Garzan	1951	5,000			3	2			26	Cretaceous ls.
Ramandag	1948	4,000		3	6	2			20	Cretaceous ls.
Total Turkey[1]				3	9	4	415	501,500		

(1) Estimated.

TURKEY REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
M.T.A. Institute, Ankara	Batman	S	1,400		

country may have. Letters of authorization allowing non-exclusive reconnaissance geological studies have been issued since to Standard Oil Co. (N. J.), American Overseas Petroleum (Caltex), Shell, Conorado Petroleum Corp., and Socony-Vacuum Oil Co., Inc. Cities Service also is studying Turkey's prospects. Last spring, the government retained Max Ball, Washington oil consultant, to assist in preparing a new oil law. Government experts made intensive studies of the laws of Venezuela, Colombia, Canada, Peru, and other countries, and it was planned to submit a draft of the legislation to the Turkish Grand National Assembly late this year.

Geological opinions vary on the prospects of finding major oil reserves in Turkey. Since 1934, the government organization has drilled some 50 wells and more than 185,000 ft. of hole. Areas of greatest interest are southeastern Turkey and the Adana basin-Hatay Province in the south central part of the country. The institute first found oil at Ramandag near Mardin in 1940 but the discovery dates from 1948 when Well 9 was acidized to give commercial production. Garzan field, 12½ miles northeast, was found in 1951. Both produce a heavy, high-sulfur crude, and the present output of about 400-600 bbl. daily is topped in a small plant and used by the state railways. These fields produce from Upper Cretaceous limestone. Ten of the wells drilled by the M.T.A. Institute since 1934 have been in the Adana-Hatay area, and one of these near Iskenderun, formerly Alexandretta, had shows of oil about a year ago.

The Turkish Government early this year awarded a contract to the Ralph M. Parsons Co., Los Angeles, for a 6,250-bbl. daily capacity refinery to be located at Batman, in southeastern Turkey, near the ancient city of Diyarbakir. The plant will operate on Ramandag and Garzan crude delivered through a 25-mile pipe line, and will meet products needs in this part of the country. The facilities will include a T.C.C. catalytic cracking unit. The refinery, which will be the only large plant in Turkey, is expected to be in operation the latter part of 1954.

Part of the reason for the decision by the government to throw Turkey open to foreign oil exploration and development stems from the heavy drain made on the economy by the necessity to import nearly all petroleum requirements. Last year, oil imports cost Turkey more than $45,000,000 and took 60 per cent of its dollar earnings. Consumption is about 55,000 bbl. daily. Socony-Vacuum and a government company supplied by Caltex each have above 40 per cent of the market. The rest is met by Shell, Anglo-Iranian, and a local Turkish company.

AFRICA

EAST AFRICA

ETHIOPIA			
Area, sq. miles	410,000	Population	10,000,000
Capital		Addis Ababa	
BRITISH SOMALILAND			
Area, sq. miles	68,000	Population	500,000
Capital		Hargeisa	
SOMALIA (ITALIAN SOMALILAND)			
Area, sq. miles	198,275	Population	1,246,000
Capital		Mogadiscio	
TANGANYIKA (BRITISH)			
Area, sq. miles	362,674	Population	7,797,000
Capital		Dar es Salaam	
KENYA (BRITISH)			
Area, sq. miles	224,960	Population	5,555,000
Capital		Nairobi	
MOZAMBIQUE (PORTUGUESE)			
Area, sq. miles	297,731	Population	5,781,000
Capital		Lourenco Marques	
MADAGASCAR (FRENCH)			
Area, sq. miles	228,850	Population	4,375,000
Capital		Tananarive	

EXPLORATORY work is being pursued along the East African coastal region from British Somaliland to southern Mozambique. The programs, as well as those in West Africa, in general are a reflection of the attention currently being given by the industry abroad to long-shot wildcat prospects. There is now no commercial oil production in Africa south of the Egyptian fields, and throughout most of the continent, the sedimentary areas are mostly small with remaining territory consisting of basement rock or covered by extensive lava flows.

The largest region of coastal sediments in East Africa covers eastern Ethiopia, Somalia, and part of British Somaliland. Sinclair Petroleum Co. has held a concession in Ethiopia since 1945 and has drilled two wells with what are reported to be encouraging results. The second, the Gumburo Hills test in the Ogaden district, was suspended this year after reaching a depth below 9,000 ft. The company has been carrying out further seismograph work.

Sinclair acquired rights in adjacent U.N.-administered Somalia and subsequently sold a half interest to the Conorado Petroleum Corp. companies—Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp. A contract party from Rogers Exploration Co. is working in the area. In British Somaliland, Conorado took rights on about 36,000 sq. miles and now has one party in the field. Another United States company, Moriqui Exploration Co., Los Angeles, filed for two concessions in British Somaliland covering about 12,000 sq. miles, and was scheduled to start initial geological work in the latter part of this year.

Another program launched during the last year is that of Shell and D'Arcy Exploration Co., Ltd. These companies jointly have been doing seismograph work on the Tankganyika coastal plain with plans calling for work later in Zanzibar, Pemba Island, and parts of Kenya. Mozambique Gulf Oil Corp. has a drilling program under way in southern Mozambique following aerial magnetometer and seismograph work over the last few years. A French company is drilling in southwestern Madagascar, and Standard-Vacuum Oil Co. has done some preliminary geological work on the island

Considerable interest was aroused early this year in reports that the Shell organization was planning the construction of a major refinery at Mombasa, Kenya, to operate on Middle East crude. A recent statement in Nairobia by the Shell Co. of East Africa indicated that no firm decision had yet been made on this undertaking.

EGYPT

Area, sq. miles	**386,000**	**Ref. cap., B/D**	**53,000**
Population	**21,425,000**	**Prod., B/D**	**45,940**
Capital	**Cairo**	**No. of fields**	**6**
Currency	**Pound**	**No. of wells**	**151**
Value	**$2.88**	**Reserves, bbl.**	**158,000,000**

SOUTHERN CALIFORNIA PETROLEUM dispatched exploration personnel and drilling crew to Egypt during the summer and on September 30, commenced drilling Feiran 2 about ½ mile from the Jersey discovery. In mid-November, the company commenced a wildcat test on the Sidri structure, 7 miles northeast of Feiran 1, and made plans to test the Baba structure with a well 8 miles due north of Sidri. The Feiran 1 well was placed on production, flowing about 130 bbl. daily of 23°-gravity crude which was being used to surface roads in the area held under concession.

The area involved includes Wadi Feiran where a Standard Oil Co. (N. J.) affiliate struck oil in 1949 shortly before abandoning its exploration program after 10 years in Egypt and an expenditure of some $16,000,000. The Swiss syndicate bought the Jersey equipment and geological information for $1,000,000. The Jersey company had drilled Wadi Feiran on a government promise of an exploration license, and the well reportedly swabbed 30-40 bbl. daily of about 25°-gravity crude. After ending its work, the company was unable to move its rigs and equipment out of the country.

Southern California's Drilling Program

During this summer, Southern California dispatched exploration personnel and drilling crews to Egypt. Its first well was scheduled to be spudded about ½ mile from the Jersey discovery, and the program called for two rigs to drill seven to nine wells.

All of Egypt's present production is by Anglo-Egyptian Oilfields, Ltd., a member of the Royal Dutch-Shell Group which has been active in Egypt since 1910. A.E.O. is the operator for the two fields discovered since the war in the Sinai, with Socony-Vacuum Oil Co., Inc., participating on a 50-50 basis in the production. About half the current 46,000 bbl. daily comes from Sudr and Asl, the Sinai fields, and most of the remainder from Ras Gharib on the west side of the Gulf of Suez.

All these fields are past their peak, and Egypt's oil output is expected to go into a slow decline in the near future unless the trend is reversed by important new discoveries. Water production is continuing to increase in Ras Gharib, and the Sinai fields have been characterized by high initial production and relatively small reserves. The older Hurghada field west of the gulf is a stripper operation, and the original Egyptian field, Gemsa, discovered in 1908, is depleted.

Legal Obstructions Are Frustrating

Politically, the record in Egypt, at least as far as the present two companies are concerned, has been one of frustration. All drilling was discontinued about 2 years ago because of several long-pending, unsettled legal problems with the government. The new regime of Gen. Mohammed Naguib gave rise to hopes that the climate for foreign oil activity would improve, but serious difficulties remain. Early this year a new mining law was promulgated, and the company law requiring an offer of 51 per cent of the stock of foreign companies to Egyptians was modified. However, it is still not clear if the companies are exempt from this unacceptable requirement. By ministerial ruling, A.E.O. and Socony-Vacuum were deprived of rights of priority on 61 areas on which they had made application for exploration rights in 1948 following considerable geological work. The 1951 agreement between the companies and the government which raised the depressed level at which the government fixes the prices of products from domestic crude was invalidated in July 1951 on procedural grounds.

Egypt, which claims leadership of the Arab world, this year will spend about $36,500,000 on imported oil products. Petroleum meets about 87 per cent of the energy needs of the country, and domestic output falls short by a third of meeting internal oil requirements which have been rising at a rate of about 10 per cent a year. A.E.O. operates the country's principal refinery at Suez, processing indigneous crude. The other plant is the government-owned refinery at Suez which recently was turned over to a nonpolitical board for its routine operation. The government took steps this year to improve the distribution system when it authorized the initial allocation of funds for a $5,800,000 products pipe line from Suez to Cairo.

EGYPT PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Asl	1948	2,870-3,870	5		1		16,531	18,201,140	22	Eocene ls.
Gemsa	1908	400-2,000			1			1,442,098	41	Miocene ls.
Hurghada	1913	700-2,500		22	3		708	38,150,304	22-30	Carb.-Mio., Con.
Ras Gharib	1938	1,200-2,500	12	102	24	1	22,831	115,428,133	25-26	Carb.-Mio., Con.
Ras Matarma	1948	1,940-3,200				3			20	Eocene ls.
Sudr	1946		8	2	4		5,870	20,422,496	19-23	Eo. ss., Mio. ls.
Total Egypt			25	126	33	4	45,940	193,644,171		

(1) Includes 23 wells on gas lift.

EGYPT REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Anglo-Egyptian Oil Fields, Ltd., Shell House, 6 Sharia Tewfic, Cairo	Suez	S,C	44,000		6,400
Raffinerie de Petrole du Government, 18 Rue Fouad Ier, Alexandria	Suez	S	9,000		
Total Egypt			53,000		6,400

NORTH AFRICA

THREE of the countries of North Africa—Tunisia, Algeria, and French Morocco—are French territories, and much of the current exploration work is a part of the vast, government-sponsored search for oil being carried on throughout the French Union. Libya to the east was created as an independent country under United Nations auspices about 2 years ago.

ALGERIA (FRENCH)

Area, sq. miles	**846,124**	**Prod., B/D**	**1,890**
Population	**8,830,000**	**No. of fields**	**1**
Capital	**Algiers**	**No. of wells**	**45**
	Reserves, bbl.	**5,000,000**	

Algeria . . . During the last 2 years large blocks of acreage have been taken out in the Sahara Desert in southern Algeria through subsidiaries or directly by three French companies and Royal Dutch-Shell. The French companies involved are Cie. Francaise des Petroles, Regie Autonome des Petroles (through Cie. des Recherches et d'Exploitation des Petroles au Sahara or C.R.E.P.S.), Shell (through majority control of Cie. des Petroles d'Algerie or C.D.P.A.), and Soc. Nationale de Recherche et d'Exploitation des Petroles en Algerie or S.N. REPAL. The two first wildcats drilled in the Sahara proper, Berraine 1 north of Ghardaia, and Toudrara Kahla 1, southeast of Colomb Bashar, both by S.N. REPAL, were dry and abandoned, but these tests only mark the opening of what is expected to be a sustained drilling program in this arid region where most of the work has to be suspended during the summer. Sheli and R.A.P. moved in equipment this fall in preparation for their first well early in 1954. Algeria's present production comes entirely from Oued Gueterini field, in northern Algeria, about 70 miles southeast of Algiers, where the operating company, Soc. des Petroles d'Amuale (S.P.A.) is an affiliate of S.N. REPAL. During the first half of 1953, S.N. REPAL drilled five dry wildcats for a total of 15,822 ft. During the same period, S.P.A. drilled two dry wildcats totaling 10,371 ft., and 19 development wells, 10 of them oil producers, with a total of 27,297 ft. During the last half of the year, S.P.A. planned three wildcats for a total of 12,000 ft. and 30 development wells for a total of 43,200 ft.

MOROCCO (FRENCH)

Area, sq. miles	**155,000**	**Prod., B/D**	**2,140**
Population	**8,410,000**	**No. of fields**	**10**
Capital	**Rabat**	**No. of wells**	**80**
Ref. cap., B/D	**2,100**	**Reserves, bbl.**	**13,000,000**

French Morocco . . . Production in French Morocco is from a group of fields known collectively as Oued Beth. The crude is moved through a 15-mile, 4-in. pipe line to a topping plant at Petitjean. The operating company, which is engaged in a continuing exploratory program, is Soc. Cherifienne des Petroles (S.C.P.), organized in 1929 and representing mainly French and Moroccan government interests. Discoveries in 1952 in the margin of a Mesozoic basin, now being developed, enhanced the prospects of this territory.

TUNISIA (FRENCH)

Area, sq. miles	**60,165**	**Population**	**3,470,000**
	Capital	**Tunis**	

Tunisia . . . No oil production has yet been found in Tunisia, but a widespread exploratory program is being carried out by three companies. One of the companies is SEREPT, owned by the French and Tunisian governments and Cie. Francaise des Petroles. SEREPT discovered the Cap Bon gas field in northern Tunisia in 1949. The field now has three wells, each with a potential of about a million cubic feet daily, and construction is scheduled to start in early 1954 on a 40-mile, 4-in. pipe line which will move gas to supplement the supply in the city of Tunis. Large concessions have been held for the last 4 years in Central and southern Tunisia by companies controlled by Gulf and Royal Dutch-Shell. Both Soc. Nord Africaine des Petroles (S.N.A.P.), the Gulf affiliate, and Cie. Francaise des Petrole de Tunisia (C.P.D.T.), the Shell affiliate, are engaged in active drill-

ALGERIA PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Oued Gueterini	1949	550-2,100	5	40	15	2	1,890	737,924	38	Eocene ls.

FRENCH MOROCCO PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Ain Hamra	1918	400-4,500		3	12		7	95,960	38	Miocene ss.
Bled Eddoum 1	1952	4,300-4,800	7			1	539	63,760	39	Dom. ss.
Bled Eddoum 2	1952	3,800-4,400	3	5			260	67,790		Lia. ls.
Bou Draa	1936	600-2,500			3			158,430		Lia. ls.
Mers El Kharez	1951	4,400-4,600	6				466	174,500	35	Pri. Meta.
Oued Beth	1947	2,900-4,600	14		2		207	733,730	35	Pri. Meta.
Oued Mellah	1948	1,800	16				166	218,790	35	Pri. Meta.
Sidi Fili 1	1950	4,500	17				434	750,590	38	Pri. Meta.
Sidi Fili 2	1952	3,900-4,600	5				52	37,520		Lia. ss.
Tselfat	1934	300-5,500		2			6	162,300	45	Lia. ls.
Total French Morocco			68	12	17	1	2,137	2,463,370		

FRENCH MOROCCO REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Ste. Cherifienne des Petroles, 27 Ave. Urbain Blanc, Rabat	Petitjean	S	2,100		(1)

(1) Catalytic cracking unit planned.

ing programs. Results in the initial tests of these companies have been negative.

LIBYA			
Area, sq. miles	679,350	Capital	Tripoli
Population	1,124,000	Currency	Pound
Value		$2.83	

Libya . . . Several large companies have shown an interest in exploratory operations in this country. During the last year a natural resources law was enacted which authorizes the granting of exclusive exploratory concessions. Some work of a preliminary nature probably will be undertaken during the coming year, but a full oil law may be necessary, to clarify the still somewhat uncertain legal situation. A number of American, British, and French companies are expected to ask acreage in Libya, among them Shell and Anglo-Iranian, Caltex, Conorado, Jersey Standard, and Socony-Vacuum.

UNION OF SOUTH AFRICA

Area, sq. miles	472,494	Currency	Pound
Population	12,912,000	Value	$2.82
Capital	Pretoria	Ref. cap., B/D	17,300

TWO important projects have been under construction in the Union of South Africa this year. One is a government-financed liquid-fuels synthesis plant. The other is the country's first petroleum refinery, a modern, new 17,300-bbl.-daily plant being built by Standard-Vacuum Oil Co.

The new Stanvac refinery is situated at Wentworth adjoining Durban on the east coast. It will process Middle East crude into a full line of major products to be distributed by Stanvac's affiliated marketing organization. The operating company for the Durban plant is Standard-Vacuum Refining Co. of South Africa, Ltd. The facilities include a fluid catalytic cracking unit and a 4½-mile pipe-line system, part of it underwater, to Durban Harbor. The refinery is scheduled to make its first runs shortly after the first of the year.

The coal-to-oil synthesis plant is being built at Coalbrook, in the Orange Free State, about 40 miles south of Johannesburg, by South African Coal, Oil & Gas Corp., which is controlled by the government. This operation has been hailed by enthusiastic South Africans as the key to the country's economic future. M. W. Kellogg Co. has the contract which includes opening virgin coal deposits, construction of aboveground gasification facilities, and a complete synthesis plant. The economics of the operation are based partly on the existence of large coal reserves lying close to the surface of the ground. Planned production includes some 4,700 bbl. daily of motor fuel and 400 bbl. daily of diesel oil, plus considerable quantities of chemicals. A recent government statement said capital costs of the S.A.S.O.L. plant had risen sharply and that they may reach £30,000,000 ($85,000,000). It is now reported the plant will not be ready for full operation for at least another year and a half.

Oil exploration on a small scale has been carried out in South Africa by the government Geological Survey. Some seismograph work has been in progress on the Zululand coast, and shallow drilling was being undertaken this this fall in northern Natal.

WEST AFRICA

NIGERIA (BRITISH)			
Area, sq. miles	338,580	Population	24,000,000
Capital		Lagos	
ANGOLA (PORTUGUESE)			
Area, sq. miles	481,350	Population	4,112,000
Capital		Luanda	
FRENCH EQUATORIAL AFRICA			
Area, sq. miles	969,000	Population	4,406,000
Capital		Brazzaville	
FRENCH WEST AFRICA			
Area, sq. miles	1,774,600	Population	16,524,000
Capital		Dakar	
FRENCH CAMEROUNS			
Area, sq. miles	166,800	Population	3,000,000
Capital		Yaounde	
BELGIAN CONGO			
Area, sq. miles	904,991	Population	11,700,000
Capital		Leopoldville	

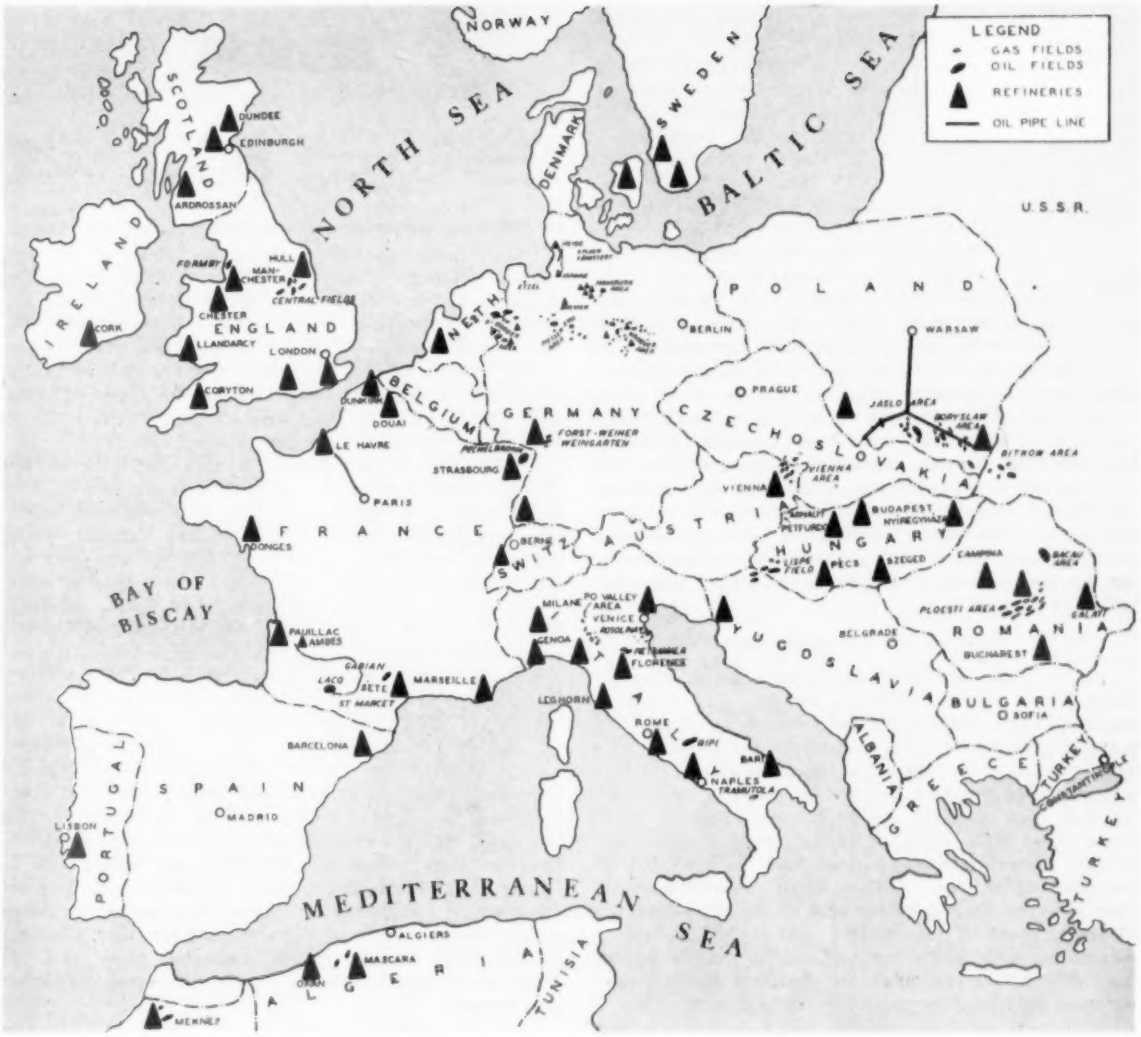
BRITISH, French, Dutch, and Belgian companies are active in the stepped-up search for oil taking place in the colonial territories of West Africa. At least eight rigs are in operation through this part of the continent, and considerable geological and geophysical work is being carried out.

Shell D'Arcy Petroleum Development Co. of Nigeria have two rigs running in the southern part of this country. The first deep test was abandoned at 11,228 ft. late last year. Recent deep drilling has been at Amansiodo near Enugu and at Akata, in Calabar Province. Other deep tests have been projected in the Niger Delta and the Nizam areas. In November, Shell announced oil had been discovered in a wildcat in Calabar Province in eastern Nigeria but that it was too early to determine whether the discovery was commercial.

A subsidiary of the Belgian company, Petrofina, is continuing work on a concession granted by the Portuguese Government in Angola. Petrofina has reported that results so far are encouraging but that it is premature to attempt to evaluate the prospects. The operating company is Cia. de Combustiveis do Lobitos (Carbonang), and the concession terms provide for one-third government participation if production is found.

Three rigs, two medium and one heavy, have been drilling for the French company, Soc. des Petroles l'Afrique Equatoriale Francaise in French Equatorial Africa. Some oil has been found but noncommercial in quantity. The program is this company is a part of the intensive over-all French effort to discover oil in metropolitan France or in the overseas territories. Cie. Francaise des Petroles is interested in the work in French Equatorial Africa.

Geophysical work and some drilling have been undertaken in the French Camerouns. The French Government's Bureau Recherches de Petrole is making geophysical studies in French West Africa, and in the Belgian Congo, a syndicate of Belgian companies has been investigating the central Congo basin.



Europe . . . Picture is one of stepped-up exploration, more drilling, bigger refineries.

EUROPE

AUSTRIA

Area, sq. miles	32,375	Currency	Schilling
Population	6,955,000	Value	$0.039
Capital	Vienna	Ref. cap., B/D	24,000
	Reserves, bbl.	200,000,000	

COMMUNIST oil production in Austria falls in a different class from that in the satellite countries of central and eastern Europe. The Russians took control of Austria's oil as an occupying power under the Potsdam agreement rather than through a puppet government such as in Romania and Hungary. The democratic Austrian Government has long sought an end not only to Russian control of all its only indigenous petroleum resources but to the occupation which makes it possible.

The Soviet Mineral Oil Administration has been markedly successful in Austria. The Russians took control in May 1945, and production that year averaged 10,200 bbl. daily. The following year it was up to 15,700 bbl. daily. In 1952 output was around 55,000 bbl. daily, and estimated production this year will average between 60,000 and 65,000 bbl. daily.

The history of Austria's oil industry revolves around two successive occupations, first by the Germans following the 1938 Anschluss, and then by Russia. With the participation of several major international companies, the fields were in an early state of development in 1938. Concentrating on known fields, the Germans poured in equipment and personnel and by 1944 brought production to 24,000 bbl. daily. Subsequently, under Russian control,

important discoveries were made at Matzen in 1949, Aderklaa in 1950 and Brockfliess in 1951.

The productive area is in the 3,000-sq.-mile Vienna basin in northeastern Austria. Matzen-Prottes, Aderklaa, and Blockfliess are all 20 to 30 miles northeast of Vienna. About 75 per cent of the total Austrian production is coming from these three areas. Matzen was mapped prewar by Rohoelgewinnings, A.G. (Shell and Socony-Vacuum); production is believed to be coming from the Pliocene or Miocene at about 6,500 ft. Austrian officials claim that the fields have been overproduced by the Russians and ultimate recovery seriously reduced.

Austria's seven small refineries, all situated near Vienna and in the Soviet Zone, have a total capacity of less than 25,000 bbl. daily. About 8,000 bbl. daily of this is in the Vacuum and Shell plants which are operated under complete Russian direction. Crude oil in excess of the needs of these plants, amounting to about 40,000 bbl. daily, is moved east into Russia's satellite countries. Up until 1951, Russian releases of products for the Austrian market were inadequate. Since then they have met virtually all demand for major products, and Austrian imports are now largely confined to lubricants, asphalt, and specialties. The OEEC estimates Austrian consumption this year at about 24,500 bbl. daily, slightly more than half of it fuel oil.

Austria's Oil a Political Issue

Austria's oil production has been a major issue between Russia and the Western Powers. The record is one of stubborn Russian resistance to any agreement that would deprive her of these properties. The facilities were taken over as former German assets under the Potsdam agreement, but the Allies pointed out many of the properties had been acquired earlier by the Germans under duress from their Austrian and foreign owners. The Western Powers agreed to a draft treaty in 1949 but the Russians balked even at these highly favorable terms. They gave the Soviets 60 per cent of the production for 30 years, much of the refining and 8-year exploratory concessions with a 25-year exploitation period. As the areas they would relinquish, the Russians selected older declining fields and unpromising exploration blocks.

BELGIUM

Area, sq. miles	**11,779**	**Currency**	**Franc**
Population	**8,705,000**	**Value**	**$0.02**
Capital	**Brussels**	**Ref. cap., B/D**	**93,300**

TWO new major plants completed during the last 2 years have raised Belgium to the status of an important refining country in Western Europe. One, the Antwerp refinery of Esso Standard Refinery, S.A., an affiliate of Standard Oil Co. (N.J.), was finished this spring and formally dedicated in September. The other is the refinery of Cie. Industrielle des Petroles, in which ownership is shared by Anglo-Iranian Oil Co., Ltd., and Cie. Financiere Belge des Petroles, S.A. (Petrofina). It was placed in operation in September 1951.

Both refineries are situated on the right bank of the Scheldt about 4 miles downstream from Antwerp. C.I.B. has modified its thermal cracking equipment for additional crude throughput, and is adding catalytic polymerization and catalytic cracking. This refinery took on added importance as it was finished a few months after Anglo-Iranian lost its properties in Iran. Esso's refinery, built at a cost of about $25,000,000, includes a Model IV catalytic cracking unit. In addition to these major Belgian refineries, it was reported early this year that the Gulf organization is considering building a refinery of about 20,000 bbl. daily capacity at Antwerp.

The OEEC forecast called for further 14 per cent annual increases in internal consumption of petroleum products in Belgium in 1953 and 1954. Anticipated consumption, including bunkers, in 1954 is about 77,000 bbl. daily. There is no crude-oil production in the country, but two large companies, Petrofina and Belgian Shell (Royal Dutch-Shell) this summer applied to the Belgian Government for exploratory rights. Both asked the same area in the provinces of Antwerp and Limburg adjacent to the Dutch frontier in the somewhat small part of Belgium covered by the main sedimentary basin of Northern Europe.

AUSTRIA REFINING

Company and address—	Refinery location	Type of plant	Distillation Charging cap., bbl. per day Therm. crk.	Cat. crk.
A. G. der Kohlenwerkstoff-Verbaende: Benzin-Benzolverband	Vosendorf[1]	S-L-A	1,100	
A. G. der Shell Florisdorfer Mineraloelfabrik, c/o Shell Austria, A. G., Weiserstrasse 2, Salsburg	Floridsdorf	S-L	3,400	
Creditul Minier, A. G.	Korneuburg[1]	S	2,400	
Donau Oeltanklager G.m.b.H.	Moosbierbaum[1]	S	4,000	
Nova Oel und Brennstoff-Gesellschaft, A. G.	Schwechat[1]	S-L	4,200	
Oesterreichische Mineraloelwerke, G.m.b.H.	Lobau[1]	S-L-A	4,900	
Okeros	Stokerau[1]	S		
Vacuum Oil Co., A. G.	Kagran	S-L-A	4,000	
Total Austria[2]			24,000	

(1) Under Russian control and administration. (2) Estimated.

BELGIUM REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day Distillation	Therm. crk.	Cat. crk.
"Albatros," S. A., Belge Pour le Raffinage de Petrole, 10 Petroleumkaai, Antwerp-Kiel	Antwerk-Kiel	S-C	11,000		3,650
Belgian Shell Co., S. A., 47 Cantersteen, Brussels	Ghent	(1)			
Cie. Industrielle "Atlas," S. A., 101 Ave. de France, Antwerp	Hoboken	S	2,100		
Esso Standard Refinery, S. A., Petroleumdok, Oostkaai, Antwerp	Antwerp	S-C	27,000	4,100	9,400
Raffinerie Belge de Petroles, S. A., 115 Ave. de France, Antwerp	Antwerp	S-C	12,500	4,200	
Raffinerie et Distilleries, Anversoises, Antwerp	Antwerp	S	1,700		
Ste. Industrielle Belge des Petroles, Boit Postale No. 55, Antwerp	Kruisschans	S-C	40,000	19,000	(2)
Total Belgium			93,300	27,300	13,050

(1) Refinery processes reduced crude oil to lubes and asphalts, early 1955. (2) Catalytic cracking, 10,000 bbl. daily, scheduled for service in

FRANCE

Area, sq. miles	213,009	Ref. cap., B/D	474,700
Population	42,600,000	Prod., B/D	7,010
Capital	Paris	No. of fields	7
Currency	Franc	No. of wells	525
Value	$0.0029	Reserves, bbl.	32,000,000

THE oil-exploration program in France and its overseas territories since the end of the war has been called the most intensive effort of its kind ever conducted by a government outside the Communist states. In the last 7 years, approximately $277,000,000 has been spent in the French Union. The program cost the equivalent of about $183,000,000 during the first 5-year period 1946-50, and for the 10-year period through 1956, the total outlay will reach $460,000,000. The work is being carried out not only in metropolitan France but also the African territories, and even in New Caledonia in the Pacific where the first well is scheduled to be drilled this year.

General direction of this vast program falls to the French Government's Bureau de Recherches de Petroles (B.R.P.), which was organized in October 1945. Of the total expenditures in the 1946-50 period, 38 per cent was direct French Government contributions through B.R.P. which holds an interest averaging 55 per cent in 10 French oil companies. Thus far, results of this exploration effort, in terms of production established, have not been notable. The entire French Union now has a production of 11,000 bbl. daily, about 7,000 bbl. daily of which is in metropolitan France. The only discovery of consequence in France itself has been Soc. Nationale des Petroles d'Aquitaine's Lacq field in the southwestern part of the country. Work at Lacq is now directed at developing production from deeper formations in the 11,500-12,000-ft. range. The only non-French company participating in the search in metropolitan France is Esso Francaise, which drilled its first well, Mano 1, about 50 miles south of Bordeaux, this year without finding production. Recent exploratory interest has been in the Paris basin where Regie Autonome des Petroles completed the first well near Verdun as a dry hole this fall. In eastern France at Steffelden, a French company, P.R.E.P.A., is developing a new field which has small but increasing production.

In July, there were 16 rotary rigs running in metropolitan France, and another 25 in various of the overseas territories, principally in North Africa. Five wells were completed during the month in metropolitan France, including one stratigraphic hole, for a total of 21,600 ft.

Oil production has been known in eastern France for many years. As early as 1770, lubricating oil was being manufactured from Pechelbronn shale. The present oil output of this historic area comes about half from shallow cable-tool holes and half from seepages on inclined slopes. St. Marcet gas field was discovered in 1939. The operating company, R.A.P., has a production of about 25,000,000 cu. ft daily which is supplied through a pipe-line system in the Garonne Valley.

France was the first country in Europe to encourage the development of a domestic refining industry. In 1938, French refineries had a capacity of about 110,000 bbl. daily and were, on balance, able to meet all internal requirements for products. Many of the plants were severely damaged or destroyed during the war, and the immediate postwar years were devoted to reconstruction. According to the OEEC forecast, total capacity will amount to about 530,000 bbl. daily by the end of next year. The major international companies—Shell, Jersey Standard, Socony-Vacuum, Anglo-Iranian, and Caltex—are all represented in the French refining industry.

FRANCE PRODUCTION

Name of field	Year of discovery	Depth range, ft	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl: Daily	Accum.	Gravity, °A.P.I.	Geological data on prod. formation
Camargue	1952	5,500	1	1	2	2	45	10,000	31	Oligocene ss., ls.
Gabin	1924	205-1,200			6			187,300		Tri., Dolo.
Gallican	1951	6,000-7,000	3	1	3			13,000		Oligocene ss.
Lacq	1949	2,100-2,400	21		9	2	5,820	4,450,000	22	Cretaceous ls.
Pechelbron	1813	600-4,000	6	489	77	2	945	19,550,000	32	Olig., Jur., Tri.
Saint Marcet	1939	4,000-6,000			2			(2)50,300	35	Cret., Jur.
Staffelfelden	1952	6,000-7,000	3			1	200	14,600		Jur. ls.
Total France			34	491	99	7	7,010	24,275,500		

(1) Estimated. (2) Distillate production.

FRANCE REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Cie. Francaise de Raffinage, 11 Rue Dr. Lanceraux, Paris 8	Gonfreville	Comp	65,000	12,600	
	La Mede	S-C-W	50,000	14,000	
Cie. Raffinage Shell-Berre, Rue de Berre, Paris 8	Berre L'Etang	Comp	70,000	9,000	8,000
	Petit Couronne	Comp	44,000	11,500	
Esso Standard, S. A., Francaise, 82 Ave. des Champs Elysees, Paris 8	Pauillac	S-A	12,000		
Pechelbronn, S. A., d'Explorations Minieries, 4 Rue Leon Jost, Paris 17	Port Jerome	Comp	44,800	6,150	10,000
Raffineries Francaises des Petroles, de L'Atlantique, Donges-St. Nazaire	Merkwiller	S	1,600		
Ste. des Raffineries de Petrole de la Gironde, 7 Palace Vendome, Paris	Donges	S-C-L	33,000	3,800	10,000
Ste. Generale des Huiles de Petrole, 21 Rue de la Bienfaisance, Paris 8	Ambes	S-C	16,500	3,600	(1)
	L'Avera	S-C	50,000	5,000	(2)
Socony Vacuum Francaise, 46 Rue de Courcelles, Paris 8	Dunkirk	Comp	45,000	6,000	
	N. D. de Gravenchon	Comp	17,300	3,140	
	Frontignan	S-C	25,500	3,380	11,150
Total France			474,700	78,200	39,150

(1) Capacity to be increased to 17,600 bbl. daily. (2) Platformer, 1,800 bbl. daily planned. (3) Platformer, 6,000 bbl. daily to be placed in service during 1955.

The buildup in refining capacity and the widespread exploration program were dictated by the fact that oil is France's most costly import. During the first half of 1953, civilian consumption gained some 10 per cent to reach an annual rate of about 266,000 bbl. daily. OEEC's forecast calls for a consumption averaging about 292,000 bbl. daily by the end of next year. This is considerably below total refining capacity, and even after meeting all domestic needs and those of the North African territories, France has a substantial products surplus for export except in heavy fuel oil, consumption of which is up about five times over prewar. The French Government hopes to work out exchange arrangements with the international companies whereby they will supply the distant French territories with French refiners in turn meeting needs in neighboring European markets.

ITALY

Area, sq. miles	**116,228**	**Ref. cap., B/D**	**358,800**
Population	**46,865,000**	**Prod., B/D**	**1,770**
Capital	**Rome**	**No. of fields**	**6**
Currency	**Lira**	**No. of wells**	**251**
Value	**$0.0016**	**Reserves, bbl.**	**6,000,000**

EXPLORATION and development on the Italian mainland are dominated by the state organization, Ente Nazionale Idrocarburi (E.N.I.) and its operating subsidiaries. The refining side of the industry is characterized by a large number of small, locally owned plants in addition to the larger refineries of the major international oil companies.

The emphasis in Italy is on the development of further natural-gas resources. The region of greatest success continues to be in the Po Valley in northern Italy, but exploratory work, both by state-controlled and private Italian companies, has been extending southward throughout all Italy. During the first half of 1953, natural-gas consumption averaged approximately 200,000,000 cu. ft. daily, a 67 per cent increase over the same period of 1952. While small by comparison to United States standards, Italy's gas is making an increasing contribution toward the energy requirements of the country. OEEC estimated that the rising consumption of gas in Italy will soon amount to the equivalent of 60,000 bbl. daily of fuel oil.

The gas pipe-line system in northern Italy, mostly state owned, was expected to exceed 3,000 miles by the end of this year. Work was in progress this year on a line from Cortemaggiore field to Turin, and plans for trunk lines extending into Central Italy were being studied. So far, virtually all the gas production has been directed

ITALY PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data or prod. formation
Centropozzi	1923			61				[1]545,500		
Cortemaggiore	1949	6,230	22		6		1,720	1,030,885	35	Mid., Mio. sand
Ozzano	1942	1,968	2	3				[1]59,700		
Salominore								[1]40,800		
Vallezza	1909	2,300	7	151			52	1,040,292	49.5	Olig., Eo. s.-ls.
Vizzola	1940	2,400	2	3				[1]25,700		
Total Italy[1]			33	218	6		1,772	2,742,877		

(1) Estimated.

ITALY REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Anonima Petroli Italian, Falconara	Falconara	S-C	[1]13,500	[1]3,000	
"Aquila" Societa Technico-Industriale, via Dante 5, Trieste	Aquila, Trieste	S-C-L	15,000	3,300	
"Condor" S.p.A. per L'Industria Petrolifera e Chemica, Milan	Milan	S-C	45,000		15,000
Delle Paine, Genoa	Genoa	S	[1]1,000		
Distilleria Italiana Catrami Affini, Carrara	Carrara	S-C	[1]3,000	[1]500	
Esso Standard Italiana, S.p.A., via Assarotti 40, Genoa	San Sabba, Trieste	S-C-L	[1]6,150	[1]3,000	
Galetti, Firenza	Firenza	S-C	[1]3,700	[1]750	
Garrone, Genoa	Genoa	S-C	[1]4,100	[1]1,900	
Industrie Chimiche Italian del Petroleo, Mantova	Mantova	S-C	10,000		4,000
I.L.S.E.A., Como	Como	S-C	[1]2,400	[1]450	
I.P.L.O.M., Genoa	Genoa	S	[1]800		
Industria Raffinazione Oli Minerali, via Barbarini 67, Rome 15	Venice	Comp.	33,000	8,000	
Lombarda Petroli, Milan	Milan	S-C	[1]4,500	[2]2,500	
Nazionale Industria Oli Lubrificanti, Milan	Milan	S-C	[1]1,250	[1]450	
Permolio, S.p.A., Corso Matteotti 10, Milan	Genoa	S-C-A	9,000		1,500
	Milan	S-L-A	[2]7,600		350
	Rome	S-C-A	9,000		1,500
Petroli D'Italia, Fiorenzuolla d'Ardia, Emilia	Piacenza	S-C	[1]6,000	[1]2,500	
Raffinerie Siciliane Oli Minerali, S. A., Augusta, Sicily	Augusta, Sicily	S-C	13,000	[1]7,000	
Raffineria Oli Lubrificanti, Viguzzolo Alexandra	Viguzzolo	S-L	[1]2,000		
San Quirico, Genoa	Genoa	S	[1]2,250		
S.A.R.O.M., Ravenna	Ravenna	S-C	[1]13,500	[1]2,500	
S.I.R.O.M., Milan	Milan	S	[1]1,500		
Sta. per Azioni Raffineria Padana Olii Minerali, Turin	Novara	S-C	13,300	3,150	(3)
Sta. per l'Industria Italiana del Petrolio, Genoa	La Spezia	Comp.	30,000	2,800	
Sta. Petrolifera Italiana, Farnovo Taro (Parma)	Farnovo Taro	S	2,200		
Socony-Vacuum Italiana, 26 Broadway, New York, U.S.A.	Naples	Comp.	60,000	5,000	
Stanlac-Industria Petrolifera, Rome	Beri	S-C	26,000	3,500	
	Livorno	S-C	16,000	1,500	
S.T.O.I., Firenza	Firenza	S-C	[1]3,000	[1]450	
Volpato, Milan	Milan	S	1,000		
Total Italy			358,800	5,200	22,350

(1) Approximate capacity at end of 1954 from June 1953 Report of O.E.E.C. (2) Includes 2,000 bbl. per day planned capacity. (3) Plans call for addition of catalytic cracking.

toward industrial uses, figures for 1952 showing 28 per cent going to the iron and steel industry and 16 per cent to textiles. Natural gas for petrochemical manufacture is actively being considered. The widening consumption of gas has already developed a competitive conflict with fuel oil in some segments of the Italian market. Enrico Mattei, E.N.I.'s chairman, this fall suggested that this competition be ended by establishing "zones of influence" in certain areas.

Italy's refining capacity has been built up to a point where it is considerably in excess of the country's own needs although the shutdown of the Abadan refinery in Iran opened some European markets which Italian refiners have been able to supply. The Italian oil association, Unione Petrolifera Italiana, is urging the government to specify the sale of oil in trade agreements with other countries, and domestically, to ease products taxes which in Italy represent 70 per cent of the cost of liquid fuels. Fuel-oil consumption in Italy, which is without major indigenous coal resources, rose 106 per cent from 1948 to 1951, but, because of natural-gas utilization, it is now flattening out. Refining capacity, according to OEEC, will amount to approximately 360,000 bbl. daily by the end of 1954.

Gulf Oil Corp. went into partnership this year with the Italian Montecatini Mining & Chemical Co. for the exploration of three blocks of about 250,000 acres each in the Abruzzi and Marche regions. Gulf is the only large foreign company with an active exploration interest in the Italian mainland. The expanding activities of the state operating company, Azienda Generale Petroli Italiana (A.G.I.P.), and the unsatisfactory terms of the 1926 Mining Law discouraged participation by foreign companies. Over the last few years Italy moved steadily toward tighter state control of oil operations, and the trend culminated early this year in passage of Law 136 creating E.N.I. as the over-all Italian oil agency and giving it exclusive rights on all future operations in the Po Valley. In Central and southern Italy, private Italian companies continue to actively explore, and several gas discoveries have been made. There are now some 28 rigs running in Italy.

From a legal standpoint, Sicily falls into a different category. This territory has regional autonomy within the Italian Republic and in 1950 it passed an oil law offering concessions to foreign companies. Macmillan Petroleum Co. had been making studies in Sicily for a number of years, and this company later joined with Gulf's American International Fuel & Petroleum Co. to form the 65 per cent Gulf, 35 per cent Macmillan Mediterran Oil Co. for further operations in Sicily. In the first well, drilled on its own acreage, American International Fuel & Petroleum in November made a discovery of 12°-16°-gravity crude at around 6,000 ft., and drilling was continuing. A second well was planned later in the year on Meriterran Oil Co. acreage. D'Arcy Exploration Co., Ltd. (Anglo-Iranian), began drilling near Vittoria after considerable surface work.

NETHERLANDS

Area, sq. miles	**13,025**	**Ref. cap., B/D**	**198,500**
Population	**10,377,000**	**Prod., B/D**	**15,760**
Capital	**Amsterdam**	**No. of fields**	**1**
Currency	**Guilder**	**No. of wells**	**163**
Value	**$0.2636**	**Reserves, bbl.**	**100,000,000**

THE complete refinery operated at Pernis, near Rotterdam, by N. V. De Bataafsche Petroleum Mij. (Royal Dutch-Shell) ranks as the largest in Europe. During the last year, a fourth distillation unit was added, and crude capacity raised from 100,000 to 167,500 bbl. Petrochemical, asphalt, and lubricating-oil facilities also are being expanded.

The second refinery in the Netherlands is the Pernis plant of the Caltex group. It has been reported that an increase in capacity for this refinery is under consideration. Also of interest in the refining field was the opening early this year of Ketjen plant at Amsterdam which produces fluid cracking catalysts. Ketjen's production, which may be doubled in 1954 to about 10,000 tons, has been taken under contract by the Shell and Jersey Standard organizations for units in West Germany, the Netherlands, Belgium, and France.

By the end of 1954, according to OEEC, consumption of petroleum products in the Netherlands will amount to about 92,000 bbl. daily, of which some 25,000 bbl. daily will be in bunkers. Internal consumption which rose an average of 8 per cent annually from 1948 to 1951 gained only 1.3 per cent in 1952 because of the stabilization of fuel-oil demand. An average increase of 6 per cent was forecast for 1953 and 1954. Thus, considerable refinery production is available for export.

Large Research Laboratory

The importance of the Netherlands in the oil industry is enhanced by the fact that B.P.M., a principal operating company of the world-wide Royal Dutch-Shell Group, is headquartered at The Hague. One of the industry's largest research laboratories is situated at Amsterdam. Early this year Arabian American Oil Co. moved the main headquarters of its service organization, Aramco Overseas Co., to The Hague. This company provides engineering and purchasing services for the Saudi Arabian operations. Another development this year was the organization of a contract drilling company in the Netherlands by Drilling & Exploration Co., Inc., Dallas, in conjunction with a local Dutch firm. The company plans later to extend its activities into soft-currency areas.

Encouraging results were obtained this year in the exploratory program that has been carried on in the Netherlands since the end of the war by Nederlandse

NETHERLANDS PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data on prod. formation
Schoonebeek[1]	1943	2,500	163			2	15,760	27,204,308	25.1	L. Cret. sand

(1) Estimated.

NETHERLANDS REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Caltex Petroleum Maatschappij (Nederland), N.V., The Hague	Pernis	S-C	31,000	12,900	
N.V. de Bataafsche Petroleum, Mij., The Hague	Pernis	Comp.	167,500	28,500	25,000
Total Netherlands			198,500	41,400	25,000

Aardolie Mij., owned 50-50 by B.P.M. and Jersey Standard. The Rijswijk discovery on the southeast edge of The Hague, which produced at a reported rate of several hundred barrels daily on initial test, was brought on commercial production. Additional drilling was under way in the area. The 32°-gravity crude is being barged to Shell's Pernis refinery. Oil shows were reported in another N.A.M. wildcat near the village of Aalden about 9 miles north of Schoonebeek field.

Previously, the only firm results from the exploration, which has cost approximately $15,000,000, were the discovery of several small gas fields. Under terms of the concession, the gas is sold at well head to the government which has been engaged in laying pipe lines to deliver the fuel to nearby municipalities. These gas fields include De Wijk and Wanneperveen in the Meppel area and Tubbergen and Denekamp south of Schoonebeek.

The existing field, Schoonebeek, has a production of heavy, viscous crude which has been stabilized at around 16,000 bbl. daily. This field, the largest in Western Europe, is now at its peak, and a gradual decline in output is expected to set in after 1954. The original discovery was made in May 1943 during the German occupation, but development did not get under way until after the war.

PORTUGAL

Area, sq. miles	**35,414**	**Capital**	**Lisbon**
Population	**8,549,000**	**Ref. cap., B/D**	**25,000**

EXCLUSIVE rights for oil refining in Portugal are held by S. A. Concessionaria de Refinacao de Petroleos em Portugal (S.A.C.O.R.) in which the government has about a third interest. In 1952, the refinery which the company operates at Cabo Ruivo (Lisbon) processed slightly under 10,000 bbl. daily.

S.A.C.O.R. is guaranteed the right to supply 50 per cent of Portugal's inland demand directly or through other established distributing companies, and, when in 1951 the government extended S.A.C.O.R.'s license through 1976, the company agreed to modernize and enlarge the refinery to a capacity of about 25,000 bbl. daily. This program has been under way during 1953 at a cost equivalent to nearly $10,000,000. The completed refinery will produce higher-quality motor fuel, lubricants, asphalt, and L.P.G. New facilities will include a catalytic cracking unit of about 10,000 bbl. daily capacity. The old refinery was built originally by a Czechoslovakian firm and much of its equipment was obsolete.

Inland consumption in Portugal amounts to about 14,500 bbl. daily with another 4,500 bbl. daily in offshore bunkers. By the end of Portugal's current Six-Year Plan, it is expected that inland consumption will rise to about 17,000 bbl. daily. Industrialization is promoting the increasing use of heavy fuel oil, but gasoline consumption has shown only slight gains due to heavy taxes and the greater use of small cars of low horsepower.

Exploration for a domestic source of crude oil has been under way in central Portugal for the last 5 years. Concession rights over scattered areas are held by Cia. dos Petroleos de Portugal, a company which is owned 51 per cent by the Portuguese Government and 49 per cent by the Swedish firm of A. Johnson & Co. The company has been using German geologists and drilling equipment. Last April the program received encouragement when the Abadia well about 25 miles north of Lisbon had a strong flow of natural gas and a non-commercial amount of heavy oil.

RUSSIA AND EASTERN EUROPE

RUSSIA (U.S.S.R.)			
Area	**8,600,000**	**Ref. cap., B/D**	**1,910,000**
Capital	**Moscow**	**Reserves, bbl.**	**9,000,000,000**
Production, bbl.		**1,004,100**	

OIL operations in the satellite countries of Eastern Europe are controlled by Russian-managed state companies with the exception of Yugoslavia which, though Communist, falls into the western political orbit. Information on these countries, as well as on Russia itself, comes almost entirely from occasional propaganda statements made by the government leaders. As far as Eastern Europe is concerned, however, these claims can sometimes be critically evaluated since the industries were operated mostly by western oil men up until the Communism ascension 5 or 6 years ago.

Early this year, reports circulated in eastern European capitals that the Soviets were planning tighter coordination of all oil activities throughout the satellite area. Such a step was regarded to be in conformity with Russian plans for closer direction and organization of all major industry in Eastern Europe. Oil operations were to be guided by an over-all council with a Russian director.

Russia . . . First actual production figures disclosed in several years were made public by Premier Malenkov when he reported output this year would total 52,000,000 metric tons, or about 1,040,000 bbl. daily. Current Russian plans call for a stepup in production at a rate of better than 100,000 bbl. daily per year. Russians claim more and more oil is being drawn from the eastern regions with lesser emphasis on the older Baku fields on the Caspian Sea. Russian statements also indicate greater attention is being given to pipe-line movement. The Russian transportation system has been one of the weakest links in the economy; pipe lines in the past have carried only about 15 per cent of total production. The claimed gains in Russian crude production are given some credence by the increasingly frequent offers of the Soviets to provide oil in bilateral trade deals with western nations. Shipments have been made to Italy, Belgium, Norway, and Denmark, and deals discussed this year with Argentina, France, Greece, Iceland, and Sweden. A possible 40,000 to 50,000 bbl. daily may be exported out of the Soviet Union and Romania next year under these agreements.

PORTUGAL REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day — Distillation	Therm. crk.	Cat. crk.
"Sacor" S. A., Concessionaria de Refinacao de Petroleos em Portugal, Rua do Alecrim 37, Lisbon	Lisbon	S-L-A	25,000		10,000

PRODUCTION IN RUSSIA AND CONTROLLED AREAS

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, ° A.P.I.	Geological data on prod. formation
Austria							56,800			
Romania							81,700			
Russia							1,004,100			
Other							27,700			
Total Russia and controlled areas							[1]1,170,300	[2]9,248,800,000		

(1) Operation of Austria's oil industry controlled principally by Russia. (2) Estimated.

Dependable information via official sources on refining operations in U.S.S.R. is not available because of censorship. Estimates from reliable sources indicate there are about 33 operable refineries in Russia. Crude-oil input rating on these plants totals around 1,010,000 bbl. per day. Cracking facilities in these refineries include thermal processes and catalytic processes. Ratio of thermal to catalytic processes is high as to thermal. The known catalytic facilities in Russian refineries are of obsolete type since they were supplied under U. S. lend-lease in the early years of World War II. Total cracking capacity for Russia is estimated at 350,000 bbl. per day.

ROMANIA REFINING

Company and address— Former owner—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Astra-Romana, S. A.[1]	Ploesti-Sud	Comp.	37,000	12,000	
Concordia, S. A. R.	Ploesti-Nord	S-L-C	22,000	4,800	
Colombia, S. A. R.	Ploesti-Sud	S-C	11,700	3,300	
Creditul Minier[3]	Brazi-Prahova	S-C	7,300	3,300	
Dacia Romano, S. A.[4]	Ploesti	S	2,900		
Doicesti, S. A. R.	Doicesti-Dambovitza	S	1,500		
Petrol Block	Ploesti-Nord	S-C	8,800	2,300	
Photogen[5]	Brasov	S-L	750		
Prahova, S. A. R.[6]	Darmanesti	S-L	6,300		
Romano-Americana, S. A.[7]	Teleajen-Prahova	S-L-C	26,000	7,900	
Steaua Romana, S. A.	Campina	S-L	16,000		
Unirea (R. O. C., Ltd.)	Moinesti-Bacau	S	1,200		
	Ploesti-Sud	S-C-L	9,600	3,200	
Venus[7]	Ploesti-Sud	S-L	1,550		
Xexia, S. A.[8]	Hamnicu-Sarat	S	1,350		
Total Romania[9]			153,950	36,800	

(1) Dutch-Shell interest now known as Prima Rafinarie. (2) Standard Oil (N. J.) interest, now known as Rafinaria Teleajen. (3) Government interest. (4) Petroleum Syndicate, Ltd., interest. (5) Socony-Vacuum interest, now known as Rafinaria Muntenia. (6) Italian interest, now known as Rafinaria de Petrol Bucuresti. Original location of refinery was Bucharest. Plant was moved to present location and placed in operation in 1951. (7) Refinery is currently known as Rafinaria R. Sarat. (8) Refinery has been idle since 1948. (9) Many of the small refineries in the Moldavia area built prior to 1907 are now shut down. Additional idle plants are located in southern Romania and Transylvania. Capacity of these plants totals about 6,000 bbl. per day. Plant ratings are estimates.

HUNGARY REFINING

Company and address— Former owner—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Fanto Egyesult Asvanyolajgyarak, R. T.	Budapest-Gyoervar[1]	S	1,100		
Hazai Koeolaj Ipar, R. T.	Budapest	S	1,000		
Magyar Petroleum Ipar, R. T.	Budapest-Csepel	S	[2]750		
"Molaj" Magyar-Szovjet Olaj Muvek, R. T.	Szoeny	S	[3]7,600		
Nyierbogdany Petroleumgyar, R. T.	Budapest-Csepel	S-L	[4]1,370		
Peti Nitrogen Muevek, R. T.	Petfuerdo	S-C	4,950	(5)	
Shell Hoeolaj, R. T.	Budapest-Csepel	S-C-L	5,000	(5)	
Szoeregy Petroleumgyar, R. T.	Szoereg	S	450		
Total Hungary[6]			22,220		

(1) Obsolete and inefficient operations, equipment expected to be dismantled. (2) War damaged plant restored to operation early in 1947. (3) Partly war damaged and some equipment dismantled by Russians. Plant restored to normal capacity since 1946. (4) Minor war damage repaired in 1946. (5) Cracking unit of unknown capacity has been recently installed. (6) Estimate from reliable source.

CZECHOSLOVAKIA REFINING

Company and address— Former operator	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
"Apollo" Raffineria Mineralnych Olejov, Uc., Spol.	Bratislava	S-C-L	[2]2,200	1,100	
Franto-Werke, A. G.	Bohumin	S-L	1,500		
	Pardubice	S-L-C	4,000	1,600	
Kralupska Raffineria Mineralnych Olejov, Uc., Spol., Prague	Kralupy n. Vlt.	S	1,000		
Priemselna A. Obchodna, Uc., Spol.	Dubova	S-L-A	1,800		
Privozer Mineraloelwerke, A. G., Morauska Ostrava	Privoz	S	1,300		
Vacuum Oil Co.	Kolin	S	1,800		
Total Czechoslovakia[3]			13,600	2,700	

(1) Now operated by government due to nationalization. (2) "Apollo" plant at Welkersdorf, rated at 400 bbl. per day, was merged with refinery at Bratislava. (3) Estimate from reliable source.

YUGOSLAVIA REFINING

Official information on status of refineries in Yugoslavia is not currently available. Estimates indicate five plants with a total capacity of 8,000 bbl. per day are located in this country.

ROMANIA

Area, sq. miles	91,700	Ref. cap., B/D	153,950
Population	16,094,000	Prod., B/D	81,700
Capital	Bucharest	Reserves, bbl.	400,000,000

Romania . . . Oldest and largest oil-producing country in Europe is Romania. Output reached a peak of about 175,000 bbl. daily in 1936. Even before the war, production was on the decline. The Ploesti region was regarded as fully explored, and with no satisfactory mining law, the last Romanian discovery of importance was in 1933. Fields and refineries were heavily damaged during the war, and since the nationalization in 1948, western observers had estimated output at 85,000-90,000 bbl. daily. In view of the history of the Romanian industry, available transportation facilities, and the general economic difficulties, there was considerable skepticism at the recent claim of the Romanian prime minister that 1953 production in Romania would be 9,300,000 tons, or about 190,000 bbl. daily, and that the plans called for nearly 11,000,000, or 225,000 bbl. daily, in 1955. The Romanian leader reported that production in the Prohova Valley basin had been expanded, and new fields found in Moldavia, the Pitesti region in Oltenia, and elsewhere. Romania's refineries, estimated to have a capacity of about 150,000 bbl. daily, he said, had been expanded and modernized.

HUNGARY

Area, sq. miles	35,912	Population	9,313,000
Capital	Budapest	Ref. cap., B/D	22,220

Hungary . . . The accuracy of reports that Hungarian oil production has been greatly increased in the last 2 years also are subject to considerable doubt. The producing industry in Hungary was developed by a Standard Oil Co. (N.J.) subsidiary before the war. In 1948, the American officials of the company were arrested, imprisoned, and finally expelled, and the properties later expropriated. Hungary is believed to be producing about 15,000 bbl. daily, possibly less, despite some reports of an output in excess of 30,000 bbl. daily. The joint Soviet Hungarian company is reported to have found a new field, Gellenaza, opened in June 1952, 10 miles south of Zalaegerozeg, and to have broadened exploration work. Here has been followed the known Russian practice of swarming into an area with a large number of rigs, making heavy withdrawals during the flush period, and later repressuring with water or gas.

CZECHOSLOVAKIA

Area, sq. miles	49,354	Capital	Prague
Population	12,340,000	Ref. cap., B/D	13,600

Czechoslovakia . . . Recent statements by Czechoslovakian officials claim that the 1953 oil goal was fulfilled in September. This indicates that during the first 9 months slightly less than 5,000 bbl. daily of natural petroleum was produced, and about 9,000 bbl. daily of synthetic oil from coal. Some of the Russian-controlled production in Austria has been moving to refineries in Czechoslovakia.

YUGOSLAVIA

Area, sq. miles	99,181	Capital	Belgrade
Population	16,729,000	Ref. cap., B/D	8,000

Yugoslavia . . . Communist Yugoslavia, a cold-war ally of the Western Powers, has received some American and British assistance in its industrial and military development. Figures reported to the United Nations show an oil production recently running at 3,000 to 3,200 bbl. daily. During the summer, the state-controlled Yugoslav oil organization reported a new discovery of Jermenovica in Banat Province on the Hungarian Plain. This, it was said, may open up an entirely new oil region in the northeast part of the country. Yugoslavia also has been modernizing its refining industry which operates partially on imported crude oil from the Middle East. It contracted with a West German firm for the construction of two plants, one at Sisak in Croatia, and another at Bosansk Brod, the latter scheduled to have gone on stream this fall. The Sisak plant, in which the German company, Fredrich Uhde, is participating with M. W. Kellogg Co., includes an Orthoflow fluid catalytic cracking unit.

SCANDANAVIAN COUNTRIES

DENMARK

Area, sq. miles	16,576	Currency	Krone
Population	4,334,000	Value	$0.145
Capital	Copenhagen	Ref. cap., B/D	900

THE Danish American Prospecting Co., a Gulf subsidiary, has been exploring in Denmark since 1938.

DENMARK REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day — Distillation	Therm. crk.	Cat. crk.
Dansk Mineraloliefabrik, Lyneborggade 9, Copenhagen	Copenhagen	S-L-A	65		
A/S Kalundborg Olieraffinaderi, 13 Sankt Annae Plads, Copenhagen	Kalundborg	S	800		
L. C. Glad Co., A. S., Copenhagen	Copenhagen	S	70		
Total Denmark			935		

NORWAY REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day — Distillation	Therm. crk.	Cat. crk.
A S Olandske Petroleums Co., Prinsgate 5, Oslo	Valloy per Tonsburg	S-L-A	1,000		

SWEDEN REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day — Distillation	Therm. crk.	Cat. crk.
A.B. Nynas-Petroleum, Nynasham	Nynasham	Comp.	11,000	2,900	
	Malmo	S-A	1,800		
Koppartranz Oljeaktiebolag, Gothenburg	Skarvik	S-C	22,000	4,400	
Total Sweden			34,800	7,300	

The work was resumed after the war, and the first deep test was drilled in 1947. An intensive program costing more than $9,000,000 has been carried out over this relatively small country. Some hopes of success were raised last year when core shows of oil and gas from Zechstein dolomites were recovered in two wells drilled near Tonder in southern Jutland, but both failed to produce on test. This year another dry hole was drilled on the Island of Lolland. Meanwhile activities of the company have been reduced. The rig used for structure drill and salt test drilling was stacked some time ago, and the lighter of the two drilling rigs has been moved to Tunisia. One of the two seismograph parties has been discontinued. However, another location for the heavier rig may be made.

The existing small refinery in Denmark is mainly for the production of asphalt. Kalundborg, where it is situated, is a seaport 60 miles west of Copenhagen. Now under construction on the outskirts of Copenhagen is a small specialized refinery with a capacity of about 3,000 bbl. daily. It is being built by the A. P. Moeller company, a large ship-owning firm, and is scheduled to go into operation the latter part of next year. It is designed primarily to produce cracked gas for use in Copenhagen and residual for ships' bunkers. Plans are being considered for expanding this project into a full-scale refinery with a capacity of 12,000 to 14,000 bbl. daily.

Consumption of petroleum products in Denmark has risen sharply since the end of the war. OEEC estimates inland consumption in 1954 will amount to 2,037,000 metric tons, or about 41,000 bbl. daily, with increases in 1953 and 1954 of 11.7 per cent each year. Fuel-oil consumption, which rose at an average rate of nearly 30 per cent annually from 1948-51, has tapered off due to the improved supply and in some cases more favorable price of coal.

SWEDEN

Area, sq. miles	**173,436**	**Currency**	**Krona**
Population	**7,126,000**	**Value**	**$0.1935**
Capital	**Stockholm**	**Ref. cap., B/D**	**34,800**

Sweden . . . Per capita consumption of petroleum products in Sweden is the highest in Europe. It amounts to 216 gal. per person per year, on the basis of 1952 figures, as compared to 106 gal. in the United Kingdom where coal meets a greater percentage of the energy requirements. OEEC estimate is for a 1954 inland consumption of 5,490,000 metric tons, or about 110,000 bbl. Fuel-oil demand, which rose about 35 per cent a year from 1948-51, has leveled off. Industrial users have turned to coal in many cases for reasons of price and availability.

The three refineries in Sweden are expected to be able to meet about 30 per cent of inland consumption next year, considering planned expansion. The Koppartranz refinery placed a second distillation unit in operation early this year. This plant is owned by Stora Kopparbergs Bergslags, a leading Swedish timber and steel company, and Transatlantic Shipping Co. of Gothenburg. A/B Nynas-Petroleum represents A. Johnson & Co. Of the two refineries operated by this company, the larger is at Nynashamm, on the Baltic about 40 miles south of Stockholm.

Indigenous oil in Sweden is confined to shale operations. The Swedish Shale Oil Co. expected to produce about 2,000 bbl. daily of crude shale oil this year. Its facilities and methods are considered to be probably the world's most nearly economic shale-oil operation. The company has found that the value of and volume of chemicals and other byproducts produced exceed those of the liquid fuels themselves.

NORWAY

Area, sq. miles	**125,182**	**Currency**	**Krone**
Population	**3,327,000**	**Value**	**$0.1405**
Capital	**Oslo**	**Ref. cap., B/D**	**1,000**

Norway . . . Inland consumption of petroleum products in Norway, according to OEEC, will reach 2,096,000 metric tons, or about 42,000 bbl. daily, in 1954. Figures for 1952 show a per capita consumption of 168 gal., next highest in Europe after Sweden. The single small refinery rebuilt after being destroyed during the war, produces mainly lubricants and asphalt. The operating company is an affiliate of Standard Oil Co. (N.J.).

SPAIN

SPAIN

Area, sq. miles	**194,232**	**Currency**	**Peseta**
Population	**28,086,000**	**Value**	**$0.0915**
Capital	**Madrid**	**Ref. cap., B/D**	**56,700**

ALTHOUGH foreign petroleum investment in Spain has been discouraged by Spanish-ownership requirements and other legal obligations, a United States group this year made the second foreign-financed exploratory effort to take place in Spain since the end of the war. The group consisted of 12 investors, most of them from Dallas and including General American Oil Co. of Texas, Delta Drilling Co., E. DeGolyer, and Texas Instruments, Inc. The group had assurances regarding remittances of profits in case of success, but any production would have been through a joint company in which the Spanish Government's I.N.I. (Instituto Nacional de Industria) would have 55 per cent ownership. After preliminary geological reconnaissance and subsequent reflection seismograph work in the concession block in the Ebro River basin, a wildcat was commenced with Delta doing the drilling. This well, Marcilla 1, about 22 miles north of Tudela and 150 miles northeast of Madrid, was abandoned during the summer after reaching 11,400 ft. Some survey work was later being carried out to determine if the program will be continued. Socony-Vacuum Oil Co., Inc., in conjunction with Spanish interests, failed in an effort to find oil in northern Spain after drilling several wells in 1948, 1949, and 1950.

SPAIN REFINING

Company and address—	Refinery location	Type of plant	—Charging cap., bbl. per day— Distillation	Therm. crk.	Cat. crk.
Cia. Arrendataria del Monopolio de Petroleos, S. A., Madrid	Hospitalet	S-L	700		
Cia. Espanola de Petroleos, S. A., Madrid	Canary Islands	Comp.	26,000	5,000	(2)
Refineria de Petroleos de Escombreras, S. A., Madrid	Cartagena	S-C	30,000	9,000	
Total Spain			56,700	14,000	

(1) Plans include additional 12,000 bbl. per day. (2) Platforming unit, 5,000 bbl. per day planned.

A 1939 law in Spain limits foreign investments to 25 per cent of the total enterprise, but exceptions have become more frequent and liberal in the last few years. However, the government is understood to insist on at least 50 per cent control. The only major refinery in continental Spain is the Escombreras plant about 7 miles southeast of Cartagena. The operating company, known by its abbreviated name REPESA, was organized in June 1949 to take over, complete, and expand a partially finished Spanish Government refinery project. Caltex holds 24 per cent interest, and I.N.I., 52 per cent. The remaining 24 per cent interest is held by the Spanish oil company, Cia. Espanola de Petroleos, S.A. (CIEPSA) which operates the other major Spanish refinery in the Canary Islands. Cia. Arrandetaria del Monopolio de Petroleos, S.A. (CAMPSA), which has a small topping plant at Barcelona, is the administrator for the government monopoly for marketing and distributing, receiving a guaranteed 5 per cent on its capital and 4 per cent of the net revenue obtained by the state.

Middle East crude supplied by Caltex from its 60 per cent share of Saudi Arabian production is charged at the Escombreras refinery. CIEPSA, which has the Canary Island refinery, has 5 per cent of the total production of crude in certain zones and fields in Lake Maracaibo in Venezuela. The output from these two recently expanded refineries is now considered sufficient to meet Spanish requirements for major products. Gasoline rationing was abolished in Spain at the beginning of 1953, and the price of motor fuel was fixed at 5½ pesetas per liter, or the equivalent of $1.92 a gallon at the official exchange rate.

UNITED KINGDOM

Area, sq. miles	94,212	Ref. cap., B/D	630,650
Population	50,545,000	Prod., B/D	1,130
Capital	London	Number of fields	5
Currency	Pound	Number of wells	243
Value	$2.81	Reserves, B/D	3,500,000

THE importance of the British oil industry stems not only from the size of the home market and the greatly expanded domestic refining capacity but to an even greater extent from the activities of British nationals in world-wide foreign oil operations. Two major international companies, Anglo-Iranian Oil Co., Ltd., and Royal Dutch-Shell (British-Dutch controlled) as well as several smaller British companies are active in all phases of the industry in many parts of the world.

These companies last year controlled approximately 30 per cent of world oil reserves. Their production amounted to about 2,000,000 bbl. daily, 16 per cent of the world total, and practically all of it outside the British Isles. Roughly a third of all crude oil and products entering into international trade came from these companies.

The tremendous refinery construction program carried out in the British Isles during the last 5 years is now largely completed. The new Kent refinery of Anglo-Iranian and the Coryton plant of Vacuum Oil Co., Ltd.,

UNITED KINGDOM PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data on prod. formation
Caunton	1943	2,000-2,200		10	1		20	192,000	28	Carboniferous
Dukes Wood	1941	1,800-2,500		113	3		470	2,621,000	34	Carboniferous
Eakring	1939	1,800-2,500		50	4		245	1,638,000	34	Carboniferous
Formby	1939	85-130		10			3	66,000	34	Keuper ss.
Kelham Hills	1941	2,000-2,200		48	4		390	1,213,000	29	Carboniferous
Total United Kingdom[1]				231	12		1,128	5,730,000		

(1) Estimated.

UNITED KINGDOM REFINING

ENGLAND

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Barton Refinery, Ltd., Twining Road, Trafford Park, Manchester 17	Trafford Park	S-L	3,500		
Berry, Wiggins & Co., Ltd., Field House Breams Buildings, Fetter Lane, London E. C. 4	Hoo, North Rochester	S	2,200		
	Weaste, Lancashire	S	1,250		
Esso Petroleum Co., Ltd., 36 Queen Anne's Gate, London S. W. 1	Fawley	Comp	140,000	6,000	41,000
Kent Oil Refineries, Ltd., Britannic House, Finsbury Circus, London E. C. 2	Isle of Grain	Comp	90,000		10,000
Lobitos Oilfields, Ltd., 146 Dashwood House, Old Broad St., London E. C. 2	Ellsmere Port	Comp	4,200	1,450	
"Shell" Refining & Marketing Co., Ltd., Houndsditch, London E. 1	Heysham	S-C	36,000	11,300	
"Shell" Refining & Marketing Co., Ltd., and Starhaven Refineries, Ltd., Houndsditch, London E. 1	Shell Haven	Comp	60,000	8,500	
	Stanlow	Comp	91,000	8,500	25,000
Vacuum Oil Co., Ltd., Caxton House, Tothill Station, London S. W. 1	Coryton	S-C-L	19,000	2,500	10,000
Total England			447,150	28,250	86,000

SCOTLAND

Scottish Oils, Ltd., 53 Bothwell St., Glasgow C. 2	Grangemouth	S-C	60,000		10,000
	Pumpherston	S-C	3,500	1,500	
Total Scotland			63,500	1,500	10,000

WALES

National Oil Refineries, Ltd., Britannic House, Finsbury Circus, London E. C. 2	Llandarcy	Comp	90,000		10,000
Total United Kingdom			630,650	29,750	106,000

(Socony-Vacuum) came into operation the early part of 1953. Of Britain's 14 refineries, 10 are properties of major oil companies and four of them are facilities of 80,000-bbl. daily or more capacity. The only new refinery in England which still may be built is a 20,000-bbl. Caltex-Trinidad Leaseholds, Ltd., plant at Southampton, but as far as is known, no firm decision has been made on this project.

British refining capacity is scheduled to show a slight further rise by the end of next year to approximately 600,000 bbl. daily. This is higher than originally planned, but additional capacity was made necessary by the loss of the Iranian facilities. All but a minor amount of this capacity has been constructed since the end of the war. The modern nature of Britain's new refineries is reflected in the fact that they have about 115,000 bbl. daily capacity in catalytic cracking and only about 2,100 bbl. daily in thermal equipment.

Consumption Highest in Europe

Consumption of petroleum products in the United Kingdom is the highest in Europe. Including about 90,000 bbl. daily for the heavy bunkering trade, consumption in 1954 is forecast by OEEC at about 460,000 bbl. daily. The rate of increase was 10 per cent in 1950 and 1951, 1.4 per cent in 1952, and an anticipated 4.7 per cent in 1953. Improved coal supplies and a leveling off in industrial activity have tapered off the rise in oil consumption in Britain as elsewhere in Europe. Oil returned to a complete free market last April when remaining price controls were removed. Premium motor fuel was introduced, and the old wartime pool grades eliminated in February. Gasoline rationing had been abolished in May 1950.

Britons, to whom the coal industry traditionally has been a mainstay of the national economy, were startled earlier this year when an official government statement pointed out anticipated 1953 exports of petroleum would have a greater value than coal shipments. During the first half of the year, oil exports had a value of $185,000,000. In 1952, about 116,000 bbl. daily was exported from Britain, including some 28,000 bbl. daily to East of Suez destinations because of the Abadan shutdown. In 1951, British crude imports surpassed those of products for the first time, and crude oil now constitutes about four-fifths of all petroleum imports into Britain.

Britain has a substantial and growing petrochemical industry with plants owned by Anglo-Iranian; Distillers, Ltd.; Monsanto; Shell; Petrochemicals, Ltd.; and Imperial Chemical Industries, Ltd. One of the country's two carbon-black plants, the Philblack installation near Bristol, is the world's largest outside the United States. British industry produces more petroleum equipment than any other country except the United States. Orders the first half of this year carried a value of $107,000,000. As of July 1, the British tanker fleet stood at 7,585,893 tons, 22 per cent of the world total and highest of any country, not excluding the United States.

Only in the field of domestic production is British activity of a minor nature. Domestic output of about 1,000 bbl. daily comes from a group of fields discovered just prior to the war in the Midlands. D'Arcy Exploration Co., Ltd. (Anglo-Iranian), the operator, began water flooding a few years ago and has successfully arrested the decline in production. The company maintains a steady, small-scale exploration program in England. It completed a test on the Isle of Wight to a 5,161 ft. depth early this year, and another unsuccessful exploratory hole at Screveton during the summer. Exploration in England met with some encouragement this fall when D'Arcy tested oil in its Plungar well at about 23 miles southeast of the present Eakring fields and another company, Steel Bros., had shows in a well at Croxteth in Lancashire.

WEST GERMANY

Area, sq. miles	94,899	Ref. cap., B/D	199,100
Population	48,478,000	Prod., B/D	44,510
Capital	Bonn	Number of fields	51
Currency	Deutsche Mark	Number of wells	2,425
Value	$0.238	Reserves, bbl.	300,00,000

THE West German oil industry is characterized by a flourishing domestic production—the largest in non-Communist Europe—and a refining capacity having a high proportion of secondary-stage processing facilities. West Germany's internal consumption of petroleum products has risen 56 per cent from the prewar level and OEEC foresees a 12 per cent gain next year to a total, including bunkers, of about 153,000 bbl. daily, with 6 per cent annual increases thereafter. Coal supplies a large part of the fuel market, and various substitute fuels are available, including about 7,000 bbl. daily of benzole used in motor vehicles.

West German oil production has been marked by a gradual but continuous rise for the last several years. A production of 3,000,000 tons, or about 60,000 bbl. daily, is anticipated in another 2 or 3 years. Most of the increase in 1952 and 1953 came from fields in the Hanover and Emsland areas, but production has been opened up in the Upper Rhine, and exploration is being conducted in other potentially new oil provinces.

West Germany's production is supported by an intensive drilling effort, although average per well production showed an encouraging rise last year to nearly 15 bbl. daily from the 12.7 bbl. daily in 1951. More than 100 rigs are operating in West Germany, and this year it was anticipated total footage would reach nearly 1,900,000, an amount exceeded only in the United States, Canada, Venezuela, and Russia. Another promising trend during the early months of 1953 was a rise in exploratory drilling to nearly one-third the total footage. Natural-gas production also is rising, and an increasing utilization in chemical operations is planned.

Most of West Germany's oil production is in the hands of German firms. The five leading companies are in order, according to 1952 output: Gewerkschaft Elwerath, Wintershall, Deutsche Erodoel, Deutsche Vacuum, and Brigitta. Vacuum is affiliated with Socony-Vacuum, and Brigitta is a joint subsidiary of Shell and Jersey Standard. Together these foreign companies last year accounted for a total of about 7,800 bbl. daily of a total of 34,000 bbl. daily.

German-owned producing, drilling, and service companies also are active in several countries of the Eastern Hemisphere outside West Germany.

Distillation capacity of West German refineries, which at the end of 1952 was about 160,000 bbl. daily, is expected to rise to 224,000 bbl. daily by the end of next year. Because of the low fuel-oil demand, the emphasis is on the construction of secondary-stage processing units. In 1952 the yield of gasoline was 30.5 per cent, and fuel oil, 16.8 per cent. By the end of next year, the OEEC estimate is that West German catalytic cracking capacity will amount to 23 per cent of total distillation capacity, a relatively high proportion in comparison with other European countries. Total refining capacity expected by the end of next year will allow all domestic requirements for products to be met, with a probable surplus in gasoline.

GERMAN PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Emsland District										
Adorf	1946	4,000-4,400			1			47,249	30	L. Cretaceous shell
Emlichheim	1944	2,400-2,900		65	47	1	2,750	5,385,527	25	L. Cretaceous sand
Georgsdorf	1944	1,600-3,300	107	34	52	1	4,130	6,277,368	24-29	L. Cretaceous, sd., ss.
Lingen	1942	2,300-3,900	2	137	46	3	2,600	4,243,028	30-32	L. Cret., Jur., s., l., ls.
Ruhlermoor	1949	2,000-2,800	28	43	13	1	4,040	2,652,074	25	L. Cretaceous, sand
Ruhlertwist	1949	2,350-2,900		50	8	2	2,900	1,828,073	25	L. Cretaceous, sand
Scheerhorn	1949	2,500-3,700	23	19	3	1	1,550	850,963	30	L. Cretaceous, sand
Total Emsland			160	348	170	9	17,970	21,284,282		
Hamburg District										
Reitbrook	1937	1,400-2,600	57	77	71		1,060	9,602,246	21-22	U. Cret., L. Eo. sd., l.
Hanover District										
Broistedt	1937	2,400-3,200		9	4		70	351,407	35	L. Cret., ss.
Calberlah	1945	160-400		8			10	43,418	22	Jurassic ss.
Eddesse-Nord	1950	500-1,170	7	26	1	7	900	220,505	26-34	L. Cret., Lia., Tri. ss.
Eddesse-Oelheim	1876	2,900-3,300		13	3	1	20	1,686,898	32	Triassic ss.
Ehra	1939	400-820		13	1		8	80,082	16	Jurassic ss.
Eicklingen-Wienhausen	1937	1,650-3,100		17	3		180	1,946,365	32-33	L. Cretaceous ss.
Eilte	1947	3,560-3,700		1			3	11,376	23	L. Cretaceous sand
Eldingen	1949	4,900-5,300	13	23	3	3	2,230	1,453,881	35	Jurassic ss.
Fuhrberg-Hambuehren	1939	260-2,170		249	86	1	920	4,240,029	22-23	Jurassic ss.
Gifhorn	1935	650-1,000		40	7		35	336,644	16	L. Cretaceous ss.
Hademstorf	1941	4,100-5,400		11	3		110	614,833	25-29	L. Cret., Jur. sand, ls.
Hohenassel	1943	1,450-2,100		38	12		450	1,604,580	31	Jurassic ls.
Hohne	1951	4,400-6,500	17	6		3	3,300	1,287,762	33-34	Jurassic, Triassic ss.
Lehrte	1952	3,600-4,000		2		3	330	8,712	31	Jurassic ss.
Meckelfeld	1938	1,000-1,670		23	1		50	397,053	24	Cretaceous ss., lime
Molme	1935	160-1,800		7	12		50	1,075,917	32	Cret., Jur. ss., ls.
Nienhagen	1899	600-5,350		186	95	1	1,500	32,672,228	22-32	L. Cret., Jur., s., ss., ls.
Nienhagen-Haenigsen	1940	2,245-2,770	1	30	7		440	3,210,719	24-28	L. Cret., sd., ss.
Oberg	1918	500-1,900		53	4		150	157,923	36-46	L. Cret., Jur., sand
Steimbke	1936	790-3,700		247	13		1,570	5,359,265	18	Cret., Jur. ss., ls.
Suderbruch	1949	3,800-7,650	15	38	8	4	3,270	2,651,690	25-37	Cret., Jur. ss., ls.
Thoeren	1941	1,550-4,100		66			360	1,466,872	19-38	L. Cret., Jur., Tri. ss.
Vorhop	1952	3,200		1		2	8	582	30	Jurassic sand
Wathlingen	1950	2,000		9	1		140	184,283	27	Cretaceous ss.
Wesendorf	1943	1,200-6,300	24	43	27	2	1,680	4,059,214	17-42	Cret., Jur. ss.
Wietze	1879	300-1,000		293			500	17,299,875	16-29	Cret., Jur., Tri. ss.
Total Hanover			77	1,452	291	27	18,284	82,422,113		
Schleswig-Holstein District										
Boostedt	1952	5,600-6,300	4	1		2	780	153,083	29-31	Jurassic sand
Heide	1935	2,600-5,900	3	61	65	2	1,380	10,719,076	21-32	Cret., Jur. ss.
Ploen	1952	6,500	2			1	360	69,914	34	Jurassic ss.
Total Schleswig-Holstein			9	62	65	5	2,520	10,942,073		
Upper Rhine Valley District										
Forst-Weiher	1934	1,200-2,600		44			40	606,603	32-34	Tri., Jur., Ter. ss.
Rot	1953	2,100-2,500		1	1	1	160	11,403	25-26	Triassic sandy clay
Stockstadt	1952	1,600	1	1		2	550	68,550	39	Oligocene ss.
Weingarten	1936	800-1,600		93	13	1	60	351,782	32-36	Oligocene sand
Total Upper Rhine Valley			1	139	14	4	810	1,038,538		
Weser-Ems District										
Aldorf	1952	3,400-3,600	5	2		1	1,000	66,321	32	Jurassic sand, ss.
Barenburg	1953	2,500				1	20		29	L. Cretaceous ss.
Dickel	1953	4,600	1			2		2,421		Jurassic
Etzel	1942	4,550-4,770		2	1	2	60	272,911	13	Jurassic lime
Hemmelte—West	1951	3,700-4,500	16	3	1	2	2,360	574,361	32	Jurassic ls., ss.
Liener	1953	3,000					13		32	Jurassic sand
Molbergen	1953	2,400		2		1	150	7,519	26	Jurassic ls.
Ostenwalde	1953	4,200		1			17	916		Cretaceous
Quakenbrueck	1950	1,270-1,950		10	2		70	305,780	35	Cretaceous, Jur. ls.
Voigtei	1953	1,500-1,700	1			1	180	2,492	31-34	Jurassic
Total Weser-Ems			23	20	4	10	3,870	1,232,721		
Total Germany			327	2,098	616	55	44,514	126,521,973		

GERMAN REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Badische Anilin und Soda-Fabrik, A. G., Ludwigshafen on Rhine	Ludwigshafen-Oppau	S-L-W	1,000		
B. P. Benzin und Petroleum, G.m.b.H, Steinstrasse, 5, 24a, Hamburg 1	Hamburg-Finkenwerder	S-C	[1]17,000	[2]8,500	
Deutsche Erdoel, A. G., Mittelweg 180, Hamburg 13	Heide	S-C-L-A	12,600		6,500
	Wietze	S-L-A	1,400		
Deutsche Gasolin, A. G., Jordanstrasse 32, Hannover	Dollbergen	S-L-A	2,500		
Deutsche Shell, A. G., Alsterufer 4-5, Hamburg 36	Hamburg-Harburg	S-L-A-W	10,000		
	Monheim	S-L	4,000		
Deutsche Vacuum Oel, A. G., Steinstrasse 5, Hamburg 1	Bremen-Oslebshausen	S-C-L-W	15,000		9,500
Ebano Raffinerie, A. G., Neuer Jungfernstieg 21, Hamburg 36	Hamburg-Harburg	S-L-A	[3]14,000	([3])	([4])
Gelsenberg Benzin, A. G., Gelsenkirchen-Horst	Gelsenkirchen-Horst	S-C	39,000		[4]18,000
Gewerkschaft Deurag-Nerag, Hindenburgstrasse 27-29, Hannover	Misburg	Comp.	11,500	4,500	
Gewerkschaft Erdoel-Raffinerie Emsland, Lingen	Lingen-Holthausen	S-C	11,000		8,500
Georg Greiser Bergbau und Chemische Fabriken Mineraloelwerke Hermann Pfeifer, G.m.b.H, Dolbergen ueber Lehrte	Dolbergen	S	500		
Kraftstoff-Handelsgesellschaft, G m b H, Rathenaustrasse 6, Essen	Essen	S	750		
Mineraloel und Asphaltwerke, A. G., Ballindamm 14-15, Hamburg 1	Ostermoor	S-A	1,500		
Mineraloelwerke Albert Sengewald, Dedenhausen ueber Lehrte	Dedenhausen	S-L	900		
Mineraloelwerke Peine, Peine bei Hannover	Peine	S-L	400		
Oelwerke Julius Schindler, G.m.b.H., Hohe Bleichen 28, Hamburg 36	Hamburg-Neuhof	S-L	4,500		
Ruhrbau, G.m.b.H., Timmerhellstrasse, Mulheim Ruhr	Muelheim	S	4,300		
Ruhrchemie, A. G., Oberhausen Holten	Oberhausen-Holten	S	6,000		
Ruhroel, G.m.b.H., Postfach 122, Bottrop	Bottrop	S	2,500	850	
Scholven-Chemie, A. G., Dorstenerstrasse 227, Gelsenkirchen-Buer	Gelsenkirchen	S	8,600		[5]5,100
Union Rheinische Braunkohlen Kraftstoff, A. G., Wesseling bei Koeln	Wesseling	S-C	28,000	12,400	[5]6,000
Wintershall, A. G., Friedrich Ebert Strasse 160, Kassel	Salzbergen	S-L	2,000		
Zeller & Gmelin, Postschliessfach 35, Eislingen-Fils	Eislingen	S-L	170		
			199,120	26,250	53,600

(1) Expansion, includes distillation unit of 12,000 bbl. per day and a Platformer of 7,000 bbl. per day. (2) Includes 3,000 bbl. per day reforming unit. (3) Undergoing expansion. Crude-oil charging capacity will increase to 36,000 bbl. per day, catalytic cracking unit of about 10,000 bbl. per day to be put on stream in late 1953. (4) Includes 8,000 bbl. per day hydrogenation. (5) Hydrogenation capacity.

SOUTHERN AND EASTERN ASIA

AUSTRALIA

Area, sq. miles	**2,974,581**	**Currency**	**Pound**
Population	**8,649,000**	**Value**	**$2.25**
Capital	**Canberra**	**Ref. cap., B/D**	**48,300**

ONE of the most pronounced petroleum industry trends since the end of the war has been that of locating refineries near centers of consumption rather than production. In Australia, which for years had only minor refining capacity, four international oil companies are now building plants with an aggregate throughput of nearly 140,000 bbl. daily.

This program involves an outlay of approximately $181,000,000, and its completion will leave the commonwealth with an exportable surplus of products. Australian petroleum consumption has doubled over the last 10 years, averaging about 104,000 bbl. daily in 1952. Although motor-fuel demand was up about 6 per cent, consumption of all products declined slightly from the record level of 1951. This was due, among other factors, to improved coal supply and reductions in wheat acreage.

Major project in Australia's new refinery construction is the 70,000-bbl.-daily plant of Australasian Petroleum Refinery, Ltd., an Anglo-Iranian subsidiary, on Cockburn Sound near Fremantle in Western Australia. This is a part of the refinery program initiated by Anglo-Iranian to replace what was lost in the Iranian nationalization. By midyear work had moved from the site-preparation to the erection phase. Completion is scheduled in mid-1955.

AUSTRALIA REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Australian Oil Refining, Ltd., Box 3929 G.P.O., Sydney	Kurnell	S-C	([1])		([1])
Australasian Petroleum Refinery, Ltd., Box 131, Fremantle	Kwinana	([2])			
Bitumen & Oil Refineries (Australia), Ltd., P.O. Box 1, Matraville	Matraville	S-C	6,000		1,500
Commonwealth Oil Refineries, Ltd., 90 William St., Melbourne	Laverton	S	3,700		
The Shell Co. of Australia, Ltd., Melbourne	Clyde	S-L-A	8,400		
	Geelong	S	[3]28,000		
Standard-Vacuum Refining Co., Ltd., P.O. Box 4054 G.P.O., Melbourne	Atona	S	[4]2,200		([4])
Total Australia			48,300		1,500

(1) New refinery scheduled for operation in 1955. (2) New refinery scheduled for service in 1955. (3) To go into service in 1954. (4) Refinery to be increased in 1955; new crude-oil capacity 22,000 bbl. daily, 9,000-bbl. cat cracker and 5,500-bbl. hydroformer units.

The other refinery projects under way in Australia are: Australian Oil Refining, Ltd., at Kurnell near Sydney; Vacuum Oil Co., Ltd., at Altona near Melbourne; and Shell Oil Co. of Australia, Ltd., at Geelong near Melbourne. Australian Oil Refining is a member of the Caltex Group. The completely new refinery at Kurnell is costing an estimated $56,500,000 and will come on stream the middle of 1955. Vacuum, affiliated with Standard-Vacuum, is expanding its existing small lubricating-oil plant at Altona into a major refinery. The Shell project at Geelong is scheduled to go into operation early next year. The facilities here include a 36-mile, 8-in. products pipe line to Melbourne, the first line of any size in the country.

Current Exploratory Activity

Efforts have been made for more than 50 years to find oil in the vast expanse of Australia. The principal exploratory program now under way is that being conducted in the Exmouth Gulf area in northwestern Australia by West Australian Petroleum, Ltd. The company is owned four-fifths by Caltex through American Overseas Petroleum, Ltd., and one-fifth by the Australian company, Ampol. In September, the company commenced drilling its first well after surface geological and seismograph work. The company shipped a heavy rig from the United States last year. Brown Drilling Co. has the contract.

Local Australian companies are continuing small-scale drilling in the Roma area in South Central Queensland. Since the turn of the century, 43 wells have been drilled in this area, some with shows of oil and gas but no commercial production has been established. In 1951, Shell abandoned an exploratory program in Queensland after a deep test was dry. Rights over several million acres in East Queensland were taken early this year by Robert Kamon, of Cisco, Tex., who was later seeking financial backing for the undertaking.

BURMA

Area, sq. miles	**261,610**	**Value**	**$0.2115**
Population	**18,859,000**	**Reserves, bbl.**	**50,000,000**
Capital	**Rangoon**	**Ref. cap., B/D**	**2,000**
Currency	**Kyat**	**Prod., B/D**	**3,400**
Number of wells		**54**	

DURING 1953, the Burmese Government moved ahead with its plan to acquire a third interest in the British-owned oil industry. Early in the year, the Burmese Supreme Court ruled that it was constitutional for the government to engage in such an arrangement. The proposed joint venture had been challenged on grounds that the constitution called for majority national control of companies developing national resources. Subsequently, the government reached an agreement with the British Government under which Britain agreed to lend Burma the $14,000,000 required for the purchase.

The Burmese oil industry is in the hands of Burmah Oil Co., Ltd. Two smaller British companies formerly active in Burma have consolidated their interests with B.O.C., and the Central Burma fields are operated jointly as Oil Concessions, Ltd. The companies had agreed to the third participation by the government, but Burma's inability to raise the necessary capital held up consummation of the plan. When it is finally carried out, B.O.C. will retain its distribution properties, while refining and producing assets will be transferred to the new partly government-owned company.

Burma's oil industry is one of the oldest in the world. Crude wells dug by hand to a few hundred feet have been bailed for centuries. The modern industry was created by British enterprise, and shortly before World War II production was averaging more than 20,000 bbl. daily, of which about 5,000 bbl. daily was consumed internally. When the British returned in 1945 after the Japanese occupation during the war, production was at a standstill and the refineries in shambles.

Companies Merge Interests

In order to carry out the rehabilitation, the three companies then merged their interests with B.O.C. holding 76.8 per cent in the combined production and refining. However, the hopeful plans for postwar reconstruction were never realized. In addition to an uncertain attitude of the new government and difficult labor problems, a virtual state of civil war in the country blocked any substantial progress. The companies had planned to build an entirely new joint refinery at Syriam near Rangoon, but this project was not carried out because much of the 327-mile pipe line from the fields was destroyed or removed by insurgent and Communist forces.

The internal situation in Burma has improved during the last year or two, and B.O.C. has been able to carry out some small-scale expansion. The refinery in Chauk field is being enlarged to about 3,000 bbl. daily capacity, and the facilities are scheduled to be placed in operation in January 1954. The expansion consists of a two-stage Winkler-Koch plant, wax-sweating and pressing equipment, bauxite-treating plant, and facilities for ethyl blending. B.O.C. has been carrying out a small drilling program in Chauk field since November 1951 when it was able to commence the first well drilled since the end of the war. Production continues to be taken from Chauk to the full extent that products can be distributed. Further evidence of the gradual pacification of the country came in August when Burmese Government military forces freed the fields at Yenangyat from insurgent control. The area, near Chauk, had been in rebel hands since 1948.

BURMA PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data on prod. formation
Chauk-Lanya[1]	1902	2,500		54		1	3,400	[2]91,600,000	36	Oligocene sand

(1) Includes other fields. (2) Postwar production estimated.

BURMA REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
The Burmah Oil Co. (Burma Concessions), Ltd., P.O. Box 1049, Merchant St., Rangoon	Chauk	S	2,000		

(1) To be increased to 3,000 bbl. daily.

INDIA

Area, sq. miles	1,221,023	Ref. cap., B/D	5,750
Population	367,000,000	Reserves, bbl.	30,000,000
Capital	New Delhi	Prod., B/D	6,300
Currency	Rupee	Number of fields	1
Value	$0.2115	Number of wells	660

THE overshadowing development of the petroleum industry in India has been in the field of refinery construction. Work is under way on two major refineries with a total capacity of 65,000 bbl. daily, and construction will begin in 1955 on a third plant of 10,000 bbl. daily capacity.

The decisions taken to build these refineries stemmed partly out of the disruption to the world oil trade following the shutdown of the Abadan refinery in Iran in 1951. India had been heavily dependent on Abadan's output, and severe shortages of products were averted only by emergency measures on the part of the marketing companies.

Construction of refineries by the three major companies serving India—Burmah-Shell, Standard-Vacuum Oil Co., and Caltex—was encouraged by the Indian Government. The government gave the companies assurances against nationalization for a period of 25 years, waived the requirement of 51 per cent Indian ownership of foreign enterprises, agreed to make foreign exchange available for remission of profits, and provided importation of crude duty-free and of equipment at a special 5¼ ad valorem rate. The companies, on the other hand, agreed to train Indians in refinery work, to offer minority stock in the local refining companies to Indian investors, and to make refinery byproducts available to other Indian industries.

Stanvac's refinery, of 25,000 bbl. daily capacity, on Trombay Island near Bombay, will be the first completed when it goes on stream next July, about 6 months ahead of the original schedule. The larger 40,000-bbl.-daily Burmah-Shell refinery is located on a site adjacent to the Stanvac plant. It is scheduled for completion in early 1955. The smaller Caltex refinery, for which the agreement with the government was made only early this year, will be at Vishakapatnam on the east coast of India.

The only oil-producing company in India—Assam Oil Co., Ltd., a subsidiary of Burmah Oil Co., Ltd.—made a new field discovery of apparent importance earlier this year at Nahorkatiya about 21 miles southwest of Digboi field. Four sands have been tested, and it is expected that these will lead to the establishment of a useful addition to the available reserves of the company. Full evaluation of the discovery awaits further drilling. Arrangements have been made for the construction of a pipe line to the company's Digboi refinery.

The Assam company late this year was preparing to carry out an expanded program of geophysical work for the winter season, including additional gravity surveys, an aerial magnetometer survey, and reflection seismic work. Exploratory drilling is continuing eastward from Digboi. In Digboi field itself, development drilling has been most at the eastern end of the area, developing sands discovered within the past few years. The Nahorkatiya well has made a small increase in refinery throughput possible. At Nichuguard, exploratory drilling met with no success as a second well has been abandoned.

Standard-Vacuum Oil Co., which carried out an aerial magnetometer survey over more than 73,000 sq. miles of the Bengal basin of India and Pakistan 2 years ago, has been negotiating with the two governments for rights under which the program can be continued. The Indian Government has recently sought to interest B.O.C. and Caltex in participating in exploration in this region.

INDONESIA

SUMATRA

Area, sq. miles	575,893	Ref. cap., B/D	85,200
Population	78,163,000	Reserves, bbl.	1,800,000,000
Capital	Jakarta	Prod., B/D	182,000
Currency	Rupiah	Number of fields	44
Value (official rate)	$0.087	Number of wells	1,069

THREE companies in Indonesia account for the country's slightly more than 200,000 bbl. daily. They are N. V. de Bataafsche Petroleum, Mij. (B.P.M.), a Royal Dutch-Shell affiliate; N. V. Standard-Vacuum Petroleum, Mij., owned by Standard Oil Co. (N. J.), and Socony-Vacuum Oil Co., Inc.; and N. V. Caltex Pacific Petroleum, Mij., owned by Standard Oil Co. of California and The Texas Co. About 130,000 bbl. daily of the production comes from a complex of fields in South Sumatra where total output is evenly divided between Stanvac and B.P.M. Caltex produces around 45,000 bbl. daily from Minas field in Central Sumatra. The remaining pro-

INDIA PRODUCTION

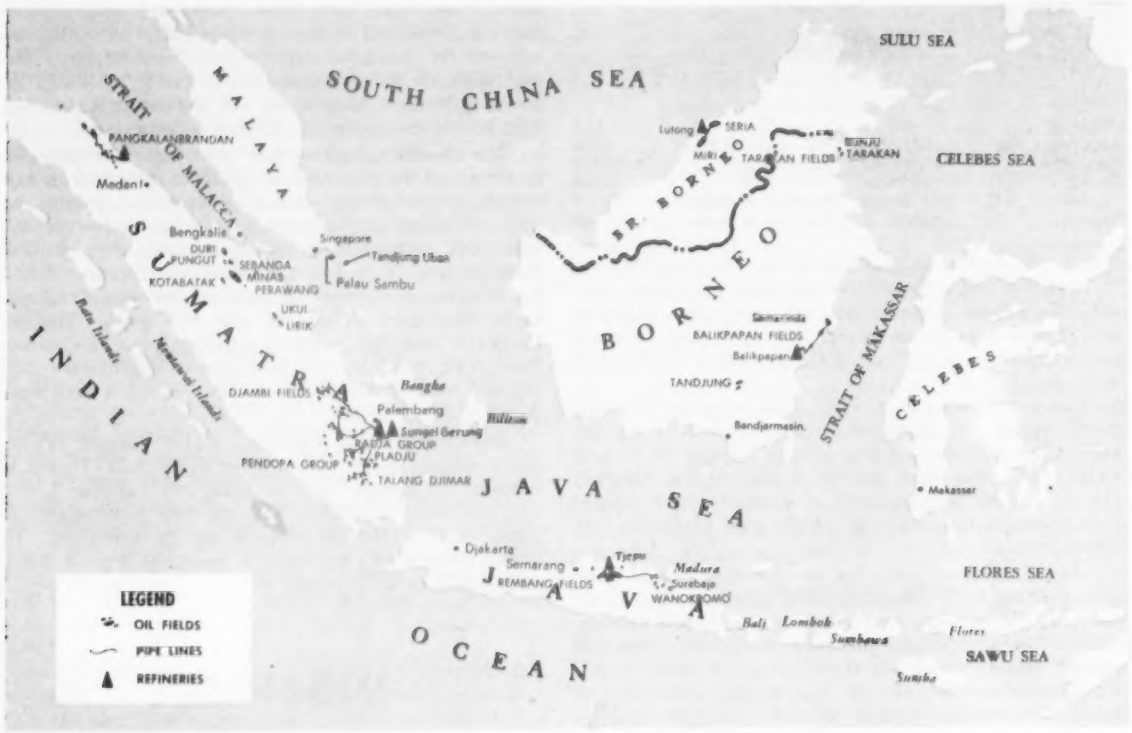
Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data or prod. formation
Digboi	1890	3,000	40	620	120	3	6,300	49,300,000	36	Mio. sand

(1) Includes 420 wells on gas lift.

INDIA REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Assam Oil Co., Ltd., Digboi P.O., Upper Assam	Digboi	Comp.	5,750	1,500	
Burmah-Shell Refineries, Ltd., Bombay	Bombay	(1)			
Standard-Vacuum Refining Co. of India, Ltd., Anand Bwahan, 54 Warden Road, Post Bag No. 6516, Bombay 26	Bombay	(2)			
Total India			5,750	1,500	

(1) New 40,000-bbl. per day refinery scheduled for completion in 1955. (2) New 27,800-bbl. per day refinery with catalytic and thermal cracking under construction. Completion scheduled for 1955.



East Indies . . . Political turmoil, lack of stability, and uncertainty hamper operations.

INDONESIA PRODUCTION

Borneo (Kalimantan)

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Anggana-Muara	1902	380-3,200	4	86	14		2,200	65,722,300	19.2-30.4	Miocene sand
Balikpapan	1903	740-765			1			236,600	14.5	Miocene sand
Bunju[1]	1930	1,970-3,100	3		21		[2]610	772,500	31.1-24.6	Pliocene sand
Sambodja	1910	160-4,400	1	47			1,060	55,611,900	23.5-32.1	Miocene sand
Sanga Sanga	1897	430-2,900	7	97	10	1	3,610	150,687,900	17.1-34.4	Miocene sand
Sangatta	1940	1,640-4,200						1,150	36	Miocene sand
Tandjung	1938	2,500-4,300	1	23			[3]5	696,800	39	Eocene sand
Tarakan	1906	195-2,400	4	465	1		5,510	171,544,100	18.4	Pliocene sand
Total Borneo			20	718	47	1	12,995	445,273,250		

(1) Field shut in, pipe line not yet available. (2) Individual well-test production. (3) Production for company use.

Brunei

Seria	1929	1,600-6,900	106	[1]102	92	4	100,758	[2]230,417,200		

(1) Includes 73 wells on other artificial lift. (2) Includes estimated oil produced by Japanese during wartime.

Ceram

Bula Lemun[1]	1897	240-920						8,203,000	23	Plio., Tri. sand

(1) Not currently active.

Java

Kawengan	1926	1,750-2,700	3	53	9	1	12,230	52,739,700	33.8	Miocene sandy ls.
Kruka	1929	970-1,600		53			879	7,997,900	27.8	Miocene ls.
Ledok[1]	1896	320-2,300						21,299,800	43	Miocene sand
Lidah Kulon[1]	1896	490-1,330						33,369,000	24.5	Miocene ls.
Nglobo-Semanggi Banjuasin[1]	1897	370-3,350						18,604,200	43	Miocene sand
Total Java			3	106	9	1	13,109	134,010,600		

(1) Inactive.

Sarawak

Miri	1911	300-3,050		126	206		859	[1]72,553,500	21.5-35	Tertiary sand

(1) Includes estimated production during Japanese occupation.

INDONESIA PRODUCTION (Continued)

SUMATRA

(Northern District)

Dj Rajeu	1929	2,520-2,590					559,000	54.5	Pliocene sand
Gebang	1936	2,970-3,400					135,000	54	Miocene sand
Pangkalan Susu	1917	1,550-2,100					6,287,000	56	Miocene sand
Pase	1939	2,000					52,000	23-30	Tertiary sand
Pulu Pandjang[1]	1928	1,640-2,400					11,243,000	55.5	Miocene sand
Perlak	1900	160-2,200					47,870,000	57	Miocene sand
P. Tabuhan	1937	3,300-3,500					3,283,000	52.5	Miocene sand
Rantau	1929	1,040-2,560					55,513,000	48.5	Miocene sand
Serang Djaja	1926	3,560-4,150					7,551,000	64.5	Miocene sand
Telaga Said D.K.G.	1893	210-720					23,621,000	51.5	Miocene sand
Total N. District							132,493,000		

(1) N.I.A.M. field.

(Central District)

Duri[1]	1940	730			6			6,027	22	Miocene sand
Kotabatak	1952	4,800			2			3,716	32	Miocene sand
Lirik	1941	1,800						568,000	34	Tertiary sand
Minas	1944	2,460	52		19	2	40,800	12,627,253	36	Miocene sand
Pungut	1951	2,940			2			200	39	Miocene sand
Sebanga[1]	1940	1,200			3			2,369	30	Miocene sand
Ukui	1941	1,800						6,000	34	Tertiary sand
Total Sumatra Cent. Dist.			52		32	2	40,800	13,213,565		

(1) Inactive since war with Japan. (2) Produced for company use. (3) Estimated average for 1953

(Southern District)

Abab	1951	6,000	3		2	1	725	357,048	35	Tertiary sand
Babat	1901	100-1,050	1	22			50	8,393,820	30	Miocene sand
Badjubang	1927	2,700-3,300	9	8	24		2,190	29,762,520	47.5	Miocene sand
Benakat	1933	1,600	48	87	6		9,980	54,636,986	38	Tertiary sand
Betun	1951	6,500	4		2		865	1,785,681	35	Tertiary sand
Betung[1]	1923	180-950						2,165,770	40.5	Miocene sand
Djirak	1930	1,000	3	111	8		5,810	32,567,417	38	Tertiary sand
Gunung Kemala	1938	6,070-6,250	12			2	9,090	3,661,270	36.3	Miocene sand
Karang Ringing[1]	1903	160-1,200						1,510,100	45.2	Miocene sand
Kenali Asam	1931	1,700-4,100	43	2	24		17,220	2,672,810	25.6-43.8	Miocene sand
Kluang[1]	1914	2,300-2,600						28,704,430	40	Miocene sand
Kruh	1941	3,500	3	6	3		475	1,175,390	38	Tertiary sand
Limau	1928	5,200-5,450	20			1	10,130	12,966,000	31.4	Miocene sand
Mangundjaja	1935	660-2,200		55	6		2,280	13,340,570	24.4	Pliocene sand
Meruo Senami[1]	1938	2,400-2,650						95,710	48	Miocene sand
Muara Enim Complex	1903	300-1,150		6			40	28,637,200	45.6	Pliocene sand
Prabumulith, West	1953	5,600	1				410	12,340	31.3	Miocene sand
Radja	1941	7,000	18		1	1	3,790	4,970,851	40	Tertiary sand
Setiti	1936	1,850-1,970				2			26	Miocene sand
Sirut	1953	6,500	1				80	19,127	37	Tertiary sand
Suban Dierigi	1905	1,300-2,500		24			440	35,880,360	46.9	Plio., Mio. s., sh.
Talang-A.-P.[2]	1922	2,800	280	48	19	1	42,250	197,128,000	38	Tertiary ss.
Talang-Djimar	1937	3,600-4,200	54	17	12	1	21,120	65,545,640	28.7	Miocene sand
Tandjung Tiga	1940	4,400-4,600	17	1			5,120	8,908,950	26.5	Miocene sand
Tanim Deras	1951	6,500	2				285	85,540	60	Tertiary sand
Tempino	1931	1,930-2,700	23	49	3	1	8,640	47,483,550	46.9	Miocene sand
T. Luntar[1]	1912	2,200-2,800						4,312,090	56	Pliocene sand
Total Sumatra S. Dist.			542	435	110	10	140,990	586,779,170		

(1) Not currently active. (2) Estimated.

New Guinea

Klamono	1936	300	1	19	4		4,590	7,983,230	18.9	Miocene ls.
Mogoi	1940	1,250			17	1			46	Miocene ls.
Wasain	1940	2,900-3,225			5	1			48	Miocene ls.
Total New Guinea			1	19	26	2	4,590	7,983,230		
Total Indonesia-N. Guinea			724	1,506	522	20	313,242	1,630,926,515		

INDONESIA REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day— Distillation	Therm. crk.	Cat. crk.
N.V. De Bataafsche Petroleum, Mij., Carl Van Bylandtlaan 30, The Hague, Netherlands	Balikpapan	S-W	48,300		
	Tjepu	S	4,600		
	Worokromo	S-A	3,200		
	Pladju	S-C	85,200	25,000	
	Lutong	S	47,300		
Sarawak Oilfields, Ltd., Miri, Sarawak					
N.V. Standard-Vacuum Petroleum, Mij., Medan Merdeka Selatan 18, Kotak Pos 154, Djakarta, Djawa	Sungei-Gerong	S-C-W	71,000	34,500	
Total Indonesia			259,600	59,500	

(1) Includes 15,000 bbl. per day of reforming capacity of which 7,500 bbl. per day are inoperative.

duction in Java and East Borneo is in the hands of B.P.M.

Indonesia's total in 1952 of 171,565 bbl. daily marked the first time the country's output had risen above the prewar level. The additional gain this year has been largely due to Minas field which only went on commercial production in the spring of 1952. Indonesia is one of the few major oil-producing countries which has failed to show a substantial increase over prewar output. The Caltex operations have provided the only large-scale development of a new area since the thirties.

Political turmoil, lack of stability, and uncertainty since the end of the war have retarded the Indonesian industry. Production is being maintained, and some exploratory work carried out on existing concessions through the use of a total of about 27 rigs, but new investment, particularly by the two larger operators, is being held to a minimum. When Indonesia gained its independence, the companies confirmed with the government the so-called "let alone" agreements under which they were allowed proceeds of their foreign-exchange earnings for rehabilitation of war-damaged facilities. Stanvac's agreement expired in 1951, and subsequent negotiations for a new agreement, which would give a firm, economic basis for expanding operations, have been inconclusive. B.P.M.'s agreement expires in 1955, and that with Caltex terminates as production expands.

Income taxes, export taxes on production, and various other levies have tended to wipe out the economic advantage held by Indonesian oil in nearby markets. There are strongly nationalistic elements in the government, and talk of nationalizing industries has had the effect of frightening away foreign capital which the new republic's economy so badly needs. In addition, the country has had difficulty establishing law and order and enforcing its authority in various areas.

Indonesia contains large areas which are untested and of interest in oil exploration. However, whatever efforts the companies are willing to take in this direction are blocked by the government's continued reluctance to grant new exploration licenses or leases on what production might be established. Indicative of the situation in Indonesia was the announcement of B.P.M. in April that it was prepared to invest an average of about $39,000,000 annually in the country over the next 10 years provided the government gave certain guarantees of security and adequate return. The company offered to negotiate a new economic policy under which the government would share 50-50 in the revenue from the industry. B.P.M.'s offer also was predicated on maintenance of law and order in the country and the return of the company's properties in North Sumatra. These latter facilities were turned over by the Japanese in 1945 to local workers in what has since become the semiindependent state of Atjeh. Political fractions in Indonesia are sharply divided on the question of whether the government should attempt to compel return of the properties to B.P.M. During the summer, a full revolt broke out in North Sumatra, and there is a serious doubt the government is able to enforce its authority in this region.

JAPAN

Area, sq. miles	**51,032**	**Ref. cap., B/D**	**125,100**
Population	**85,500,000**	**Reserves, bbl.**	**28,000,000**
Capital	**Tokyo**	**Prod., B/D**	**5,840**
Currency	**Yen**	**Number of fields**	**49**
Value	**$0.0028**	**Number of wells**	**3,572**

FACED with a rapidly rising demand for oil, the Japanese Government has sought to encourage the expansion of domestic production. The Petroleum Resources Development Council recently recommended a program under the government would finance work designed to raise output from the present level of approximately 6,000 bbl. daily to more than 17,000 bbl. daily. The government was asked to put up $15,400,000 of the $28,000,00 estimated to be necessary. The plan called for increasing output of existing fields to 7,300 bbl. daily, adding another 2,000 bbl. daily by secondary recovery, and obtaining 8,000 bbl. daily from new discoveries.

Japanese oil production, which dates back to 1875, reached a peak of 7,200 bbl. daily in 1940 and declined in subsequent years. After the war, American advisers with the occupation forces assisted the industry, and some modernization of equipment and methods was accomplished. The success of secondary recovery in the shallow, depleted reservoirs of Yabase field has led to further work of this nature. The government gives a subsidy to the producing companies which for this year was expected to amount to the equivalent of about $110,000. These funds are allotted principally to exploration, geological surveying, and water flooding.

During the first half of 1953, four exploration wells were completed in Japan for a total of 11,220 ft. Three of these were oil wells, and one a gas discovery. During the same period, 55 development wells were completed, 16 of them oil wells, 35 gas wells, and 4 dry. Total footage for the development wells was 137,400 ft. For the last half of the year, estimated wildcat completions numbered 29, for a total of 115,500 ft. Estimated development wells totaled 40 for the second half, with a total of 92,400 ft. The magnitude of the drilling effort required to sustain Japan's small production is reflected in the fact that 44 rigs of all types were in operation at the middle of the year. The producing industry is dominated by Imperial Oil Co., representing the government and private Japanese interests. Imperial accounts for about 97 per cent of Japan's output.

Although several small topping plants are operated to process the indigneous production, the major part of Japan's refining industry is in the so-called Pacific refineries which operate on imported crude. These plants were closed after the war, and some marked for reparations. This policy was later reversed, and the refineries began reopening in January 1950. The Japanese companies owning the plants needed an assured source of crude oil and, even more urgently, financing and technical assistance with rehabilitation and modernization. The foreign companies were anxious to obtain markets and local refining capacity, and out of this situation, arose a number of mergers and capital tieups between the two groups. The prewar arrangement between Mitsubishi Oil Co. and Tide Water Associated Oil Co. was resumed. Prewar sales agreements were extended to the refining field by Toa Nenryo and Standard-Vacuum Oil Co. and by Showa Oil

and Shell. New agreements were made between Nippon Oil Co. and Caltex by the formation of a new company, Nippon Petroleum Refining Co., and between Koa Oil and Caltex. A sales arrangement covering crude and products was made between Maruzen Oil and Union Oil Co. of California.

Consumption of products in Japan rose to nearly 90,000 bbl. daily in 1952. This compared to about 60,000 bbl. daily in 1951 and 42,000 bbl. daily in 1950. Heavy fuel oil made such inroads into markets traditionally served by coal that the country's coal producers asked the government to take steps to halt the trend.

JAPAN PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data or prod. formation
Koetoi	1922	1,950		7	1		4	34,933	39	Pliocene sh.
Masuhoro	1926	990			1		1	44,657	29	Miocene sand
Menashi	1915	1,370		6			1	16,039	30	Miocene sh., sand
Yuchi	1939	1,150		3				7,282		Miocene sh., sand
Ishikari	1903	1,450		99	4	1	30	917,088	40.5	Plio., Mio. sand
Atsuda	1931	520		8			3	25,455	38.4	Pliocene sand
Furuoi	1924	1,430		68			18	342,441	26.5	Miocene sand
Karumai	1907	1,080		43	1		8	397,797	29.5	Plio., Mio. sand
Hachimori	1938	1,480	2	51	7	1	136	750,164	16	Miocene fluct. vol.
Hibiki	1919	720		17		1	11	97,958	11.4	Miocene tuff
Asanai	1938	380		17			3	23,530	16.5	Miocene sand
Kurokawa	1912	1,250		96	10		80	7,465,799	18.4	Miocene tuff
Urayama	1915	890		64	5		32	863,146		Miocene sh., tuff
Toyokawa	1913	920		124	10		74	5,194,335		Mio. fluct. sh., tuff
Michikawa	1918	820		14		1	73	2,392,261	14	Mio. fluct. sh., tuff
Nigorikawa	1918	900		79	2				21.4	Miocene tuff
Asahikawa	1908	980		112	4		58	2,031,799	21	Miocene tuff
Niida	1924	2,950		5			7	140,935	21	Miocene tuff
Yabase	1934	320-5,580	166	260	61	20	3,369	14,448,618	28-36	Miocene sand, tuff
Toyoiwa	1920	2,950		4			6	39,053	23	Miocene sd., tuff, sh.
Katsurane	1919	1,960		70	1		21	769,831	32.3	Miocene sand
Hanekawa	1919	1,140		23	2		6	301,243	30.6	Miocene tuff
Katsute	1921	2,130		66	1		19	957,820	30	Miocene tuff
Innai	1934	2,540		61	8		329	4,007,445	22.3	Mio. sand, tuff, sh.
Nishi-Innai	1951			4			44	30,593		Miocene
Kamioguni	1923	2,130		67	18	1	80	1,252,804	27	Miocene tuff, shale
Katsurazaka	1937	2,290		23			60	428,541	27.5	Miocene sand or tuff
Kotaki	1938	1,650		40	3	1	35	244,477	24.7	Miocene sand or tuff
Kamihama	1941	1,310		15			42	163,949	16	Miocene llp. tuff
Chokaizan	1923	1,640		23	4		26	408,483	13	Miocene tuff
Narahashi	1947	650		19	2		80	237,407	16	Pliocene sand
Ishinazaka	1944	650	4	10	4		113	541,676	18	Pliocene sand
Echigo-kurokawa	1940	400		97		3	14	247,239	24	Pliocene sand
Kajigawa	1949	2,490		1		1	21	78,703	27.3	Pliocene sand
Shibata	1945	2,710		4			15	89,736	24.5	Pliocene sand
Niitsu	1896	410-4,270 1,600	2	649	31	2	399	18,521,492	18.6	Miocene tuff or sand
Omo	1916	3,300		43	2		22	1,382,336	27.7	Miocene sand
Higashiyama	1893	590-2,100 1,030		247	7		183	7,230,259	33.4	Miocene sand
Kengamine	1941	1,970		1			1	3,793	41.3	Miocene sand
Torigoe	1905	1,150	1	42			6	536,914	18.7	Plio., Mio. sand
Betsuyama	1920	5,000	2	32			64	518,200	23	Miocene sand
Nishiyama	1897	1,050	1	178			108	12,306,634	37.4	Miocene sand
Miyagawa	1895	1,970		25			6	1,949,102	33.6	Miocene sand
Amaze	1888	1,970				1		212,947	37.4	Miocene sand
Takamachi	1924	3,500		65			24	3,271,208	18	Miocene sand
Kashiwazaki	1935	4,350		1			1	10,095	37.4	Miocene sand
Gozu	1934	2,950		19	2		5	56,105	38	Miocene sand
Maki	1900	1,580		145			11	933,139	39.8	Miocene sand
Sagara	1908	495		17		1	1	29,452	41	Miocene sand
Others				330	137	10	182			
Total Japan			178	3,394	328	44	5,836	91,954,913		

(1) Total for Michikawa and Nigorikawa

JAPAN REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Daikyo Oil Co., Bridge-Stone Bldg., Tokyo	Yokkaichi Mie-Kei	S-A	16,000		(1)
Koa Oil Co., Ltd., Tokyo	Yamaguchi Pref.	Comp	10,000	1,400	(2)
Maruzen Oil Co., Ltd., Tokyo	Matsuyama	S	5,000		
	Kaisogun	Comp	11,500		(4)
Mitsubishi Oil Co., Ltd., Tokyo	Kangawa Pref.	S-C-A	15,600	3,000	(7)
Nippon Mining Co., Ltd., Tokyo	Akita Pref.	S-A	3,200		
Nippon Petroleum Refining Co., Ltd., Tokyo	Yokohama	S-L-A	12,000		(5)
	Kudamatsu	S-L-A	7,000		(6)
Showa Oil Co., Ltd., Tokyo	Kanagwa Pref.	Comp	12,400		(7)
	Akita Pref.	S-A	3,000		
	Niigata City	S-A	6,000		
Toa Nenryo Kogyo K.K., Tokyo	Shizuoka Pref.	S-L-A	6,700		
	Wakayama Pref.	S-C-L	16,700	3,900	(10)
Total Japan			125,100	8,300	

(1) Catalytic cracking, 3,500 bbl. daily to be installed. (2) Installation of 1,200 bbl. per day catalytic reforming unit planned. (3) Refinery to be increased to 31,500 bbl. daily. (4) Catalytic cracking, 3,000 bbl. per day to be added. (5) Plans call for addition of lube-oil facilities. (6) Capacity to be increased to 23,600 bbl. daily. (7) Catalytic reformer, 1,500 bbl. per day to be added. (8) Catalytic cracking unit, 5,000 bbl. per day, to be added. (9) Catalytic reformer, 1,200 bbl. daily, to be added. (10) Plant capacity to be increased to 10,000 bbl. daily. (11) Hydroforming unit, 4,700 bbl. daily, to be added.

NEW GUINEA

NETHERLANDS NEW GUINEA

Area, sq. miles	159,375	Reserves, bbl.	100,000,000
Population	1,018,000	Prod., B/D	4,600
Capital	Hollandia	Number of fields	3
Number of wells		20	

PAPUA-NEW GUINEA (AUSTRALIAN)

Area, sq. miles	183,540	Population	1,300,000

THE Island of New Guinea, one of the world's largest, consists of two territories. Western New Guinea is under control of the Netherlands, though claimed by Indonesia. It has a production of about 5,000 bbl. daily. The operating company is Nederlandsche Nieuw Guinee Petroleum Mij. (N.N.G.P.M.) owned 40 per cent by Bataafsche Petroleum Mij. (Royal Dutch-Shell), 40 per cent by Standard-Vacuum Oil Co., and 20 per cent by Far Pacific Investments, Inc. (Standard Oil Co. of California and The Texas Co.).

The eastern part of the island since 1945 has been administered by Australia as the U.N. Provisional Administration of Papua-New Guinea. Two associated companies with the same ownership have been exploring in Australian New Guinea since before the war. They are Australasian Petroleum Co., Ltd., and Island Exploration Co., Ltd., owned by Anglo-Iranian Oil Co., Ltd., Standard-Vacuum Oil Co., Ltd., and the Australian company, Oil Search, Ltd.

Program Expanded in 1946

The program in Papua was resumed in 1946 on a considerably expanded basis. No commercial production has yet been found, although the equivalent of more than $25,000,000 has been spent in exploring this difficult, jungle-covered terrain where in places rainfall is as high as 200 in. a year. D'Arcy Exploration Co., Ltd., (Anglo-Iranian) is the operator. Work is now being carried out in the western part of the territory where a Canadian company under contract did an aerial magnetometer survey last year over about 35,000 sq. miles. This covered the Fly River area. The Omati well, latest of a series of six tests in Papua, has been taken to about 14,000 ft. to become the deepest hole drilled in the Southern Hemisphere.

In Western, or Dutch, New Guinea, three fields have been discovered, but only one, Klamono, is now producing. A 39-mile, 8-in. pipe line to a terminal at the mouth of the Moetoeri River is due to be completed in 1954 to bring the other two fields, Mogoi and Wasian, on commercial production. The Western New Guinea operation was begun in 1935 with Shell as the operator. Klamono, near the western end of the Vogelkop Peninsula, was discovered in 1936. Here heavy oil is encountered at a depth of only about 330 ft. The crude is moved to a shipping terminal at Sorong through a 30-mile pipe line. Mogoi and Wasain are in the eastern part of the Vogelkop which is even more difficult and inaccessible country. Wasian produces from 2,950 ft., and Mogoi, from 1,640 ft. The crude from both fields is waxy and paraffinic, of about 47° gravity. Exploration and developments of these areas has involved an expenditure of around $55,000,000. The operation requires a staff of 275 Europeans, mainly Dutch, and a native labor force of about 5,000.

NORTH BORNEO

NORTH BORNEO, BRUNEI, AND SARAWAK

Area, sq. miles	81,700	Ref. cap., B/D	95,600
Population	925,100	Reserves, bbl.	550,000,000
Currency	Dollar	Prod., B/D	129,859
Value	$0.329	Number of fields	17
Number of wells		1,387	

THE British territories of Borneo consist of three states, the Crown Colony of North Borneo (formerly British North Borneo), the protected sultanate of Brunei, and the Crown Colony of Sarawak. Brunei, sandwiched in between the two larger territories, is roughly the size of Kuwait in the Persian Gulf. Since the end of the war, Brunei's Seria field has become the largest producing field in the Far East, and Brunei the largest oil-producing territory in the British Commonwealth aside from Canada. The other North Borneo field is Miri, situated about 35 miles southwest of Seria in Sarawak.

The operating companies are members of the Royal Dutch-Shell Group: in Brunei and North Borneo, British Malayan Petroleum Co., Ltd., and in Sarawak, Sarawak Oilfields, Ltd. The discovery of Seria in 1929 laid the basis for the present major production. By 1940 the field was running more than 20,000 bbl. daily. During the war, the field facilities and the Lutong refinery in Sarawak were subjected to successive destruction, first by the British in December 1941 as the Japanese approached, then in Allied bombing raids in 1944, and finally by the Japanese in 1945 when the Australians recaptured the area. Returned company personnel carried out a rapid rehabilitation, shipping the first postwar cargo in March 1946 and reopening the refinery in December of the same year.

Although early postwar plans for a large new refinery were not followed, expansion of the facilities at Lutong has made the plant one of the major processing units in the Far East. Over the last year, a new natural-gasoline plant has been under construction at Seria, along with a new 4-in. pipe line to Lutong which will carry the extracted light fractions to the refinery for blending. In this area, the Shell companies have continued a program of construction of housing and other auxiliary facilities.

Seria Field Production

Seria field coveres an area about 10 miles long and 1½ miles wide along the coast. Production was stabilized about 2 years ago at what presumably is its maximum efficient rate of slightly in excess of 100,000 bbl. daily. With the postwar development realized, considerable emphasis is being placed on exploration. In 1952 there were seven geological and geophysical parties in the field. This year, British Malayan has been drilling its first offshore platform wells in the South China Sea. Even before the war some Seria production was obtained from wells located on jetties and drilled directionally. In December 1952 the company commenced the first platform test, about a mile offshore, and the program called for four holes from the same structure. One unusual feature of the operation has been the use of an aerial ropeway for hauling personnel and material. Because of the frequent expended periods of bad weather, boat transportation was not considered reliable.

Other exploratory drilling is being carried out this

year in the Labis area 30 miles inland from Seria field. On the Klias Peninsula in the North Borneo Crown Colony, British Malayan has made location for a deep test to begin in 1954. On the east coast of the colony, gravity work is under way on the Dent Peninsula. Wildcat drilling in these areas encounters some of the world's most difficult jungle and swamp.

State Development Program

The postwar surge of production in Brunei has given rise to a state development program similar to those adopted by some of the oil-wealthy countries of the Middle East. In July, the Brunei sultan approved a 5-year program under which Seria oil royalties will be used to build up public services, agriculture, and communications. Although the terms of the Brunei oil concession have not been published, an indication of the state's revenue was given in the announcement that the 5-year program will cost the equivalent of $33,000,000. Last year, the concession in Sarawak was renegotiated, royalty increased, work obligations instituted, and the company required to reduce the area held, formerly the entire colony, by 75 per cent over the next 15 years.

PAKISTAN

Area, sq. miles	**365,907**	**Ref. cap., B/D**	**4,000**
Population	**75,842,000**	**Reserves, bbl.**	**25,000,000**
Capital	**Karachi**	**Prod., B/D**	**4,330**
Currency	**Rupee**	**Number of fields**	**4**
Value	**$0.305**	**Number of wells**	**28**

TWO British-owned companies operate in Pakistan. One is Burmah Oil Co., Ltd., through its subsidiary, Pakistan Petroleum, Ltd. The other is Attock Oil Co., Ltd., which has an exploration subsidiary, Pakistan Oilfields, Ltd. Both companies have small production and are engaged in active exploration programs.

The production is entirely in the Powar basin about 700 miles from the seacoast in the Punjab in West Pakistan. Attock operates the four fields, running the crude through a pipe-line system consisting of 79 miles of 6-in., to its topping plant at Rawalpindi. The company's output averages about 2,800 to 3,000 bbl. daily. Three years ago, Pakistan Petroleum made a discovery near one of these fields. Balkassar, and now produces about 1,300 bbl. daily, sending the crude to Rawalpindi for processing.

Pakistan Petroleum's exploration extends widely over both East and West Pakistan. Its most significant recent success was the discovery of the Sui gas field last year in an area in Baluchistan about 350 miles from Karachi. The drilling of a second well about 4 miles north of the discovery confirmed the presence of a gas field of some importance. Utilization of the gas presents a difficult problem in this remote location, but the company retained C. Stribling Snodgrass, former foreign division director for the Petroleum Administration for Defense, who went to Pakistan and studied the possibilities. Arrangements for the production and distribution of the gas are under active consideration. Pakistan Petroleum now has drilling another Baluchistan wildcat, the Zin test, about 55 miles northwest of Sui, and seismic surveys are being planned for the alluvial region to the southeast.

Pakistan Petroleum's results in East Pakistan have so far been disappointing. A program in Patharia was abandoned after the last of four wells failed to give commercial production. Seismic work is about to commence on the Sylhet structure, and a wildcat is drilling at Patiya, near Chittagong.

Basic Oil Law Passed in 1939

Pakistan's basic oil law was passed in 1949. Its terms appear workable but American company officials who have studied the situation say the oil law must be considered together with taxes and other legislation which are burdensome. Of the 34 exploration concessions granted since 1949, 22 have been to Pakistan Petroleum. Ten others have been to Attock's subsidiary which has completed one dry wildcat at Dhariala, has one drilling at Bairs, and is doing structure drilling in the Karsal area. One feature of Pakistan's oil law requires 30 per cent of the stock of the local companies to be offered to Pakistanis. In the case of the two present companies, only a part was taken publicly, and the remainder was bought by the government.

More than a year ago, B.O.C. preposed to build a refinery at Karachi. A 10,000-bbl. daily plant was mentioned, operating on imported crude oil. A technical commission from the company later studied the feasibility of the project, and reported to the government. Pakistan's petroleum consumption amounts to about 25,000 bbl. daily, all met by imports except for production from the Rawalpindi plant which is sold in the local market.

The Rawalpindi refinery is currently processing 4,000 bbl. of crude per day from four fields in the Powar basin. This is the entire present production of the country.

Refining facilities consist of an atmospheric crude distillation unit, with attendant facilities for handling the various straightrun fractions which are taken off as products.

PAKISTAN PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data or prod. formation
Balkassar	1946	8,000	6		2	2	3,300		26	Eocene ls.
Dhulian	1937	7,700-8,300	21			1	700		35	Eocene ls.
Joya Mair	1944	7,000	1		1		300		22	Eocene ls.
Khaur	1915						25		37	U. Tertiary ss.
Total Pakistan[1]			28		3	3	[2]4,325	1,557,900		

(1) Estimate. (2) Exclusive of Attock Oil Co., Ltd., operations.

PAKISTAN REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Attock Oil Co., Ltd., 24-28 Lombard St., London E. C. 3, England	Rawalpindi (Punjab)	S	4,000		

SOUTH AMERICA

ARGENTINA

Area, sq. miles	1,084,359	**Ref. cap., B/D**	174,600
Population	18,056,000	**Prod., B/D**	77,000
Capital	Buenos Aires	**Number of fields**	5
Currency	Peso	**Number of wells**	1,285
Value, free rate	$0.0725	**Reserves, bbl.**	325,000,000

INDICATIONS that Argentina is now receptive to exploration and development offers from foreign oil companies have failed to raise much enthusiasm. Official Argentine policy has long been directed toward a complete state-operated oil industry.

First sign of a reversal of this attitude came during the summer with the passage of a bill promising certain new mining and manufacturing enterprises the right to remit profits up to 8 per cent and capital after 10 years from the date of investment. Subsequent reports were that the Perón regime was giving first priority to oil investments and that it was prepared to make drilling and development deals with foreign companies, possibly on the Mexican percentage-of-production pattern. The reaction in the larger oil companies was cautious. Generally it was felt that there are much more attractive opportunities elsewhere, such as Canada and Peru, than in limited, uncertain participation in Argentina's oil industry.

The desire for foreign oil capital in Argentina arises out of the increasing gap between domestic production and the rapidly growing demand. Argentina imports the first quarter of 1953 averaged about 115,000 bbl. daily, up 3 per cent from the previous quarter, and all fuel imports were costing the Argentina economy approximately $500,000 daily. Production the first half of this year was up to 76,700 bbl. daily, but the 1952 output of 67,000 bbl. daily was for example, only about 2,000 bbl. daily more than in 1948.

The oil industry in Argentina is dominated by Yacimientos Petroliferos Fiscales, the government operating company. The four private producing companies, principally Shell, Astra, and Jersey Standard, have shown a gradually declining output while Y.P.F.'s total has gained. From 1951 to 1952, Y.P.F. production rose from 51,000 to 53,300 bbl. daily, while non-Y.P.F. output dropped from 16,000 to 14,600 bbl. daily. With no new concessions allowed since 1934, except jointly with the government, the private companies are confined to producing existing acreage which amounts to 386 sq. miles.

Much of Y.P.F.'s recent production increase is due to development of the 1951 Campo Duran discovery near the Bolivian border. Early this year, a new Y.P.F. discovery was announced at Madre Jones, 30 miles from Campo Duran. Potential of the well was reported at 3,000 bbl. daily of crude and 35,000,000 cu. ft. of gas. Another new field discovery this year was in Mendoza Province, southeast of Tupungato near the Piedras Coloradas River, where production of the initial well was given as 1,000 to 1,250 bbl. daily.

The major project in Argentine refining has been the expansion of Y.P.F. Eva Perón (formerly Puerto La Plata) plant. Construction nearing completion this year was expected to give the refinery a capacity of about

ARGENTINA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Principal producing districts:										
Caleta										
Comodoro Rivadavia										
Mendoza										
Neuquen										
Salta										
Total Argentina[1]			5	1,280		2	77,000	523,052,000		

(1) Due to censorship, data on government operations are not currently available. Above figures obtained from best available sources are estimates.

ARGENTINA REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Cia. Condor, Levalle 27, Avellaneda	Avellaneda	S	900		
Cia. General Asfaltos, Buenos Aires	Buenos Aires	S	400		
Cia La Isura, S. A., Ave. Pte. R.S. Pena 699, Buenos Aires	Bahia Blanca	S-C	2,000	1,000	
Diadema Argentina, S. A. de Petroleo, Roque 788, Saenz Pena, Buenos Aires	Buenos Aires	S-C	18,000	12,000	
Esso Productora de Petrolea, S. A. Avda. Roque Saenz Pena 567, Buenos Aires	Manuel Elordi	S	1,250		
	Plaza Huincul	S	450		
Esso Refinadora de Petroleo, S. A. Avda. Roque Saenz Pena 567, Buenos Aires	Campana	Comp.	25,000	11,000	
	Bahia Blanca	S-C	5,500	2,750	
	Avellaneda	S	300		
Lottero y Papinia, Avellaneda, Yacimientos Petroliferos Fiscales, Avda. Roque Saenz Pena 777, Buenos Aires	Avellaneda[1]	S-C	6,000	2,500	
	Buenos Aires	S-C	5,500	2,000	
	La Plata (Eva Peron)	S-C	85,000	25,000	
	Lujan de Cuyo	S-C	5,000	3,000	
	Plaza Huincul	S	1,300		
	Salta	S	2,000		
	San Lorenzo	S-C	16,000	6,200	
Total Argentina[2]			174,600	65,450	

(1) Formerly operated by Ultramar, S. A. (2) Partly estimated.

Argentina . . . Eyes foreign capital.

105,000 bbl. daily. Kellogg Pan American Corp. has the contract for the facilities which include two crude stills, a fluid catalytic cracking unit, delayed coker, vacuum feed unit, and alkylation plant. A pipe line delivering products from the refinery to Buenos Aires has been laid. Out of a total Argentine refining capacity of nearly 200,000 bbl. daily, about 60 per cent is in plants of Y.P.F., including the Ultramar refinery which the former joint owners, Socony-Vacuum and Texas, sold the government 3 years ago under pressure of exchange and import restrictions. Of the remaining private refiners, Diadema (Royal Dutch-Shell) has a 600-bbl.-daily lubricating-oil plant under construction at its 18,000-bbl. daily refinery in Argentina.

Considerable interest was aroused last summer when Argentina concluded a 1-year trade treaty with Soviet Russia. The agreement involves an exchange of commodities between the two countries which may run as high as $200,000,000. Russia agreed to supply 500,000 metric tons of crude oil—about 10,000 bbl. daily—and oilfield machinery along with other goods.

BOLIVIA

Area, sq. miles	**424,162**	**Ref. cap., B/D**	**10,900**
Population	**3,089,000**	**Prod., B/D**	**1,380**
Capital	**La Paz**	**Number of fields**	**5**
Currency	**Boliviano**	**Number of wells**	**45**
Value	**$0.0167**	**Reserves, bbl.**	**12,000,000**

TWO developments this year promise more intensive exploration and development in southern Bolivia than the government agency, Yacimientos Petroliferos Fiscales, Bolivianos, has been able to carry out. One was the signing of a concession contract with the Houston operator, Glenn McCarthy. The other was an agreement with Brazil for joint operations in the Santa Cruz area.

In 1951, Bolivia reversed its state-monopoly oil policy and invited foreign operators to make offers for concessions in certain designated sections. Until the McCarthy contract, the results of this invitation had been negative. At least part of the reason lies in the economics of Bolivian oil development. Domestic demand is small, and an export operation requires large reserves to justify the transportation to the seacoast or other major markets.

Y.P.F.B.'s principal difficulty is lack of capital. Using an Export-Import loan originally negotiated during the war, Y.P.F.B. built up refining capacity in Bolivia to about 9,000 bbl. daily and connected the two plants at Cochabamba and Sucre to the producing area with what is

BOLIVIA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Bermejo	1922	3,300		6	1	1	190		26	Permian sand
Camiri	1926	3,000	23	5	3	3	900		53	Devonian sand
Guairuy	1950	2,000	1				41			Devonian sand
Los Monos	1949	2,900			1	1			44	Devonian sand
Sanandita	1926	2,200		10	5	1	249		42	Devonian sand
Total Bolivia[1]			24	21	10	6	1,380	6,846,500		

(1) Estimated.

BOLIVIA REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Yacimientos Petroliferos Fiscales Bolivianos, Ave. Gral. Camacho, La Paz	Camiri	S	1,500		
	Cochabamba	S	5,000		
	Sanandita	S	410		
	Sucre	S	4,000		
Total Bolivia			10,910		

known as the world's highest pipe line, a system which reaches an elevation of nearly 10,000 ft. However, further bank funds, for the development of production, have not been forthcoming.

The Standard Oil Co. (N.J.) organization took a concession in Bolivia in 1921 and 10 years later brought Camiri field into production. The company fell into disfavor with the military government in 1937 and its holdings were expropriated. Under a 1942 agreement, Bolivia paid Jersey Standard $1,750,000 as compensation. While the 1951 policy opening Bolivia to limited foreign oil development has been continued under the present revolutionary government, the country's somewhat turbulent political record and its troubles with Jersey Standard also discourage foreign oil investment.

McCarthy's Activities

McCarthy obtained a sulfur mining concession in Bolivia in 1952. His oil concession this year covers about 970,000 acres in the Agua Salada and Los Monos areas. In 1951, Y.P.F.B. recovered about 120 bbl. from the only well drilled on the Los Monos structure. The contract gives assurances against nationalization, provides a 16 to 40 per cent royalty on a rising scale, and contains an obligation for a $5,000,000 expenditure over a 3-year period. A rig and personnel were sent from the United States this fall to get the program under way and meet the deadline of a drilling obligation.

The Bolivian-Brazilian oil agreement followed plans provided in a 1938 treaty between the two countries. Each is to advance $1,000,000 for the initial operations. Brazil has first claim on any production up to a minimum quota, thus recovering its share of the expenses.

Consumption of petroleum products in Bolivia amounts to about 3,000 bbl. daily. Of the present approximately 1,400 bbl. daily production, 72 per cent comes from Camiri, 17 per cent from Bermejo, and the remainder from Sanandita field. Last June, distribution and imports were centralized in a government monopoly under control of Y.P.F.B. and covering all the country except two northern departments.

BRAZIL

Area, sq. miles	3,228,042	Ref. cap., B/D	97,300
Population	54,477,000	Prod., B/D	2,390
Capital	Rio de Janeiro	Number of fields	8
Currency	Cruzeiro	Number of wells	152
Value, free rate	$0.021	Reserves, bbl.	50,000,000

PETROLEUM operations in Brazil were placed in the hands of a new government corporation under provisions of a bill passed in September by the Congress and signed by President Getulio Vargas. The corporation, Petroleo Brasileiro, S. A., or Petrobras, was given exclusive rights in all branches of the industry except marketing.

Passage of the bill establishing a complete federal monopoly ended nearly 2 years of legislative consideration and about 15 years of intermittent political controversy. As finally written, the measure represented a full victory for ultranationalist elements who kept up a steady campaign to block even the most limited type of foreign participation in Brazilian oil development. The bill asserted a government monopoly for all exploration, development, refining, and transportation of Brazilian oil, and provided for the eventual absorption of private refineries now operating or under construction. The Conselho Nacional do Petroleo, which has been in charge of Brazilian oil activities, was made an overriding advisory body. Heavy taxes on the sale of petroleum products and new excise levies on automobiles, aircraft, and boats were provided to finance Petrobras.

As far as foreign oil companies are concerned, the Petrobras bill crystallized and confirmed an existing situation. Because of legal uncertainties, these companies have been confined to importing and distribution. The capital to be generated from within Brazil for Petrobras runs into many millions of cruzeiros, but whether the country's already strained economy can find foreign

BRAZIL PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data on prod. formation
Agua Grande	1950	1,280		2					37	Cretaceous ss.
Aratu	1941	800		2					50	Cretaceous ss.
Candeias	1941	1,000	17	48		1			32	Cretaceous ss.
Dom Joao	1947	350		52		2			38	Cretaceous ss.
Itaparica	1941	800		18		1			30	Cretaceous ss.
Lobato-Joanes	1939	750		4					31	Cretaceous ss.
Paramirim	1950	1,200		1					35	Cretaceous ss.
Pedras	1951	250	1	7					41	Cretaceous ss.
Total Brazil[1]			18	134		4	2,390	3,213,000		

(1) Estimated.

BRAZIL REFINING

Company and address	Refinery location	Type of plant	Distillation Charging cap., bbl. per day:	Therm. crk.	Cat. crk.
Cia. de Petroleo da Amazonia, S. A.	Manaus	S-C	[1]5,000		2,500
Distilaria Rio Grandanse de Petroleo, Uruguaiana	Uruguariana[2]	S	300		
Industrias Matarazzo de Energia, Sao Paulo	Sao Paulo	S-W-A	1,000		
"Ypiranga," S. A., Companhia Brasileira de Petroleo, Rua Val Porto No. 51, Rio Grande, RGS.	Rio Grande	S-C-A	6,000	2,000	
Refinaria de Manguinhos, S. A., Rio de Janeiro	Rio de Janeiro	S	10,000	7,000	
Refineria e Exploracao de Petrole "Uniao," S. A., Capuava, Sao Paulo	Capuava	S	[3]20,000		[1]10,000
Refinaria Nacional de Petroleo, S. A.	Cubatao	S-C	[3]45,000	15,000	
	Mataripe	S-C	5,000	2,500	
Total Brazil			97,300	26,500	35,000

(1) Estimated. (2) Privately owned; operated by "Ypiranga." (3) New refinery to be placed in service in 1954.

exchange for the necessary and technical services was problematical.

Brazil's domestic production, all from a group of fields developed by C.N.P. in the Reconcava area in Bahia, so far meets only a fraction of domestic consumption which this year is estimated to average about 136,000 bbl. daily. Brazil's oil requirements are rising at a rate of some 20 per cent a year, and the output of the Bahia fields amounts to around 2,600 bbl. daily. C.N.P. has carried out exploration and development to the extent of its resources, but so far has failed to find production outside the Reconcava area.

During the first 9 months of 1953, C.N.P. drilled six wildcats and had three others projected for the final quarter of the year. This compares to four exploratory holes drilled in all 1952. Of the six wildcats drilled the first 9 months, one was an oil discovery, three were dry, and two were still drilling. The discovery was on the Catu Mata trend where the wells are expected to produce about 300 bbl. daily. Wells of all types drilled by C.N.P. in Brazil during the first 8 months of the year were 54, and another 25 were contemplated for the remainder of the year. This gives a total of 79 for the year, an increase of 18 wells above the 61 drilled in 1951.

Brazil's present refining capacity is only 12,300 bbl. daily, 5,000 bbl. daily of which is in the Mataripe plant in Bahia. However, 77,500 bbl. daily in new capacity is under construction. The principal project is the 45,000-bbl.-daily Cubatao refinery at Sao Paulo. This government-owned refinery is under construction at Manaus on the Amazon. Private Brazilian firms also are constructing a 20,000-bbl.-daily refinery at Capauava and a 10,000-bbl.-daily refinery at Rio de Janeiro. Under terms of the Petrobras bill, these refineries cannot expand their capacity and their stock may be bought by Petrobras to convert them into subsidiaries in which the government company must hold at least 51 per cent.

CHILE

Area, sq. miles	**286,396**	**Value, free rate**	**$0.0095**
Population	**5,885,000**	**Ref. cap., B/D**	**20,000**
Capital	**Santiago**	**Prod., B/D**	**3,050**
Currency	**Peso**	**Number of fields**	**12**
Reserves, bbl.		**55,000,000**	

OIL operations in Chile, except for distribution, are controlled by Empresa Nacional del Petroleo, the government agency which was organized in 1950 to take over the oil activities of another state organization, the Corporaccion de Fomento. E.N.P. is continuing a steady program of exploration and development in Tierra del Fuego and is building the country's first major oil refinery at Concon, 10 miles from Valparaiso.

In Tierra del Fuego on the southern tip of Chile, 12 separate reservoirs have been found in what is known as the world's most southerly oil producing area. Two new field discoveries this year were Side, about 3 miles east of Chanarcillo, and Mazano, a gas find. Mazano is the first discovery of Miocene age production. During the first half of 1953, E.N.P. completed seven exploratory wells, five of them dry, for a total of 52,802 ft. Eight development wells, of which three were successful, were finished with a total of 59,805 ft. For the last half of the year, six exploratory wells totaling about 50,000 ft. and 10 development wells totaling 70,000 ft. were projected.

The facilities in the field area include a 30,000,000-cu.-ft. gasoline and recycling plant which is connected with Sombrero and Victoria Sur fields by a 23-mile, 6⅝-in. pipe line, a 700-bbl.-daily topping plant, compressor plant with 3,300 hp., and a stabilization unit with a capacity of 6,000 bbl. daily. The six fields now on production had an output of 3,070 bbl. daily the first half of 1953, and of this about half was produced by Sombrero. Manantiales, the original 1945 discovery, has been cut back and is being given gas injection through three input wells.

First Commercial Production in 1949

First commercial production began in Chile in 1949. Lacking refining facilities, the government organization contracted to sell crude to the state-controlled A.N.C.A.P. in Uruguay. In 1952, crude exports to Uruguay amounted to 830,000 bbl. valued at $2,860,000. To the end of 1952, total exports to Uruguay since the shipments began were some 2,200,000 bbl. valued at $6,800,000.

The money received by Chile from its oil sales has been devoted to the construction of the new Concon refinery. This plant, being built by M. W. Kellogg Co., is scheduled to go on stream the middle of 1954. Crude capacity will be 20,000 bbl. daily, and the facilities will include thermal cracking, thermal reforming, and visbreaking. The refinery is expected to produce about 10,000 bbl. daily of gasoline, 1,500 bbl. daily of kerosine,

CHILE PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Angostura	1950	7,500			1			4,518	46	U. Cretaceous ss.
Chanarcillo	1950	7,600	2		1		503	103,070	46	U. Cretaceous ss.
Chanarcillo Sur	1952	7,500			1			16	46	U. Cretaceous ss.
Delgada	1951	7,600			3			1,567	39	U. Cretaceous ss.
Espora	1949	7,500			1			4,490	46	U. Cretaceous ss.
Manantiales	1945	7,500	2		21		206	849,035	42	U. Cretaceous ss.
Manzano	1953	4,000-5,000			1					Miocene ss.
Punta Baja	1952	7,500			2					U. Cretaceous ss.
Side	1953	7,100			1			384	42	U. Cretaceous ss.
Sombrero	1950	7,500	4		8	2	1,560	949,317	42	U. Cretaceous ss.
Victoria Norte	1950	7,600	1		2	1	206	71,028	42	U. Cretaceous ss.
Victoria Sur	1950	7,500	3		12		572	920,629	42	U. Cretaceous ss.
Total Chile			12		54	3	3,047	2,913,354		

CHILE REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Empresa Nacional del Petroleo, Ramon Nieto 920, Santiago	Concon[1]	S-C	20,000		13,400

(1) New refinery, scheduled for operation in 1954.

3,500 bbl. daily of distillates, and 2,000 bbl. daily of fuel oil. This anticipated production of gasoline and kerosine will be sufficient to satisfy domestic requirements. When the refinery comes on stream, production from the E.N.P. fields will be stepped up to meet a quarter to a third of the throughput. The refinery is designed to handle both sweet and sour crudes, and Esso Export Corp. has a 5-year contract, won in competitive bidding, to supply non-Chilean crude for the plant.

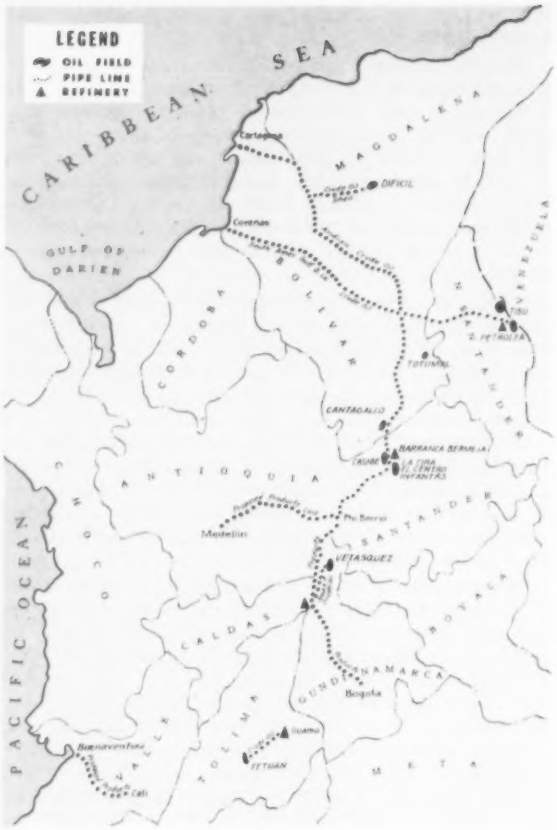
The refinery will be served by a system of pipe lines, part now under construction. Crude will be brought through a 11-mile, 10¾-in. line from a tanker terminal. Fuel oil and other products will be moved through two 7-mile, 8⅝-in. lines to Salinas. Planned for later construction are two 80-mile lines to Santiago, one of 6⅝-in. for refinery gas, and the other of 8⅝-in. for products.

COLOMBIA

Area, sq. miles	**439,518**	**Ref. cap., B/D**	**30,700**
Population	**11,768,000**	**Prod., B/D**	**106,100**
Capital	**Bogota**	**Number of fields**	**18**
Currency	**Peso**	**Number of wells**	**1,528**
Value	**$0.40**	**Reserves, bbl.**	**550,000,000**

EXPLORATION work in Colombia continues to meet with sporadic success. International Petroleum Co. (Colombia) Ltd., made a new field discovery last spring in the Butarama area. The area is about 9 miles northwest of the company's Totumal well which was brought in the latter part of 1951. The Totumal discovery came less than 6 months after International gave up the largest producing area in Colombia, De Mares, on the normal expiration the 30-year concession term. Both new areas, Totumal and Butarama, are still in an early stage of development.

Previous to these discoveries, Colombian Petroleum Co. found oil in the Sardinata structure in the Barco in 1950, and Texas Petroleum Co. brought in the Tetuan



Colombia . . . Studying over-all oil position.

COLOMBIA PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Buturama	1953	6,000			1	1			35	Cretaceous ls.
Cantagallo	1942	4,250-7,660	5	1	1	1	1,420	2,283,665	21.1	Eocene sand
Carbonera	1939	1,500-1,985		2		1	43	115,576	21-39	Eocene ss.
Casabe	1941	2,140-5,660	16	270	49	17	36,831	65,158,227	20.9	Mio., Eo., Olig. sand
Colorado	1930	3,400-4,200	5		9		250	628,500	28	Eo., Olig. ss.
El Dificil	1943	5,500-5,800	11		5		1,135	4,652,148	43	Oligocene ls.
Galan[1]	1945	3,800-4,050		4	1		280	396,500	20	Eo., Olig. ss.
Infantas[1]	1915	300-3,600	1	249	185	2	8,500	164,421,000	26	Eo., Olig. ss.
La Cira[1]	1926	200-4,300	5	741	121	7	27,500	272,534,000	24	Eo., Olig. ss.
Ortega	1951	5,300			2	1			28.6	Cretaceous ls.
Petrolea	1933	700-1,320	15	4	39		540	31,650,293	46	Cretaceous ls.-ss.
Rio de Oro	1920	8,300	8	1	1	1	615	510,716	50	Cretaceous ls.-ss.
Sardinata	1950	9,400	3				847	664,931	45	Cretaceous ls.-ss.
Tetaun	1949	2,700			4			21,532	21.4	Cretaceous ls.
Tibu (heavy)	1940	4,300	52	121	14	4	18,228	45,100,501	32	Eocene ls.-ss.
Tibu (light)		8,500					5,111	10,214,617	46	Cretaceous ls.-ss.
Totumal	1951	8,000			3	1			26	Cretaceous ls.-sh.
Valasquez	1946	6,800-7,100	14		14	3	5,000	3,345,514	26.1	Eocene ss.
Total Colombia			135	1,393	449	39	[2]106,100	[3]601,697,720		

(1) Estimated. (2) Partly estimated.

COLOMBIA REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Colombian Petroleum Co., Apartado 100, Cucuta	Petrolea field	S	[1]2,200		
Empresa Colombiana de Petroleos, Barrancabermeja	Barrancabermeja[2]	S	[3]27,500	[4]	[4]
Texas Petroleum Co., Bogota	Guamo	S	1,000		
Total Colombia			30,700		

(1) Increased capacity for 1954. (2) Operated by International Petroleum (Colombia), Ltd. (3) Capacity to be increased to 30,000 bbl. daily. (4) Plans call for addition of catalytic and thermal cracking.

and Ortega areas in 1950 and 1951. Although Colombia has been explored for many years with what some geologists feel are on the whole poor results, there are still numerous untested areas, and with the more favorable legal and tax situation resulting from modification of various laws over the last 3 years, the effort to find further substantial production shows no appreciable reduction.

International disclosed its intention of returning to the Llanos of eastern Peru early this year when it asked for exploratory rights on six areas totaling about 1,550,000 acres. The government-owned Empresa Colombiana de Petroleos, which took over De Mares on behalf of the government, launched a deep-drilling program with a new rig in Infantas field. Texas Petroleum's Tasajero test near Cucuta was unsuccessful but further drilling was under way.

Major Refinery Being Modernized

Work was nearing completion the latter part of the year on the modernization and expansion of the Barrancabermeja refinery now operated by International under lease from Empresa Colombiana. Barrancabermeja is the only major refinery in Colombia, and the new facilities will upgrade and improve the products output. Texas Petroleum in August inaugurated a 19-mile, 4-in. pipe line from Tetuan and Ortega to Guamo where operations began in a 1,000-bbl.-daily topping plant. Colombian Petroleum was working on the construction of a new 2,200-bbl.-daily refining plant to replace its present 1,000-bbl. unit at Petrolea. This is expected to be completed the first quarter of 1954.

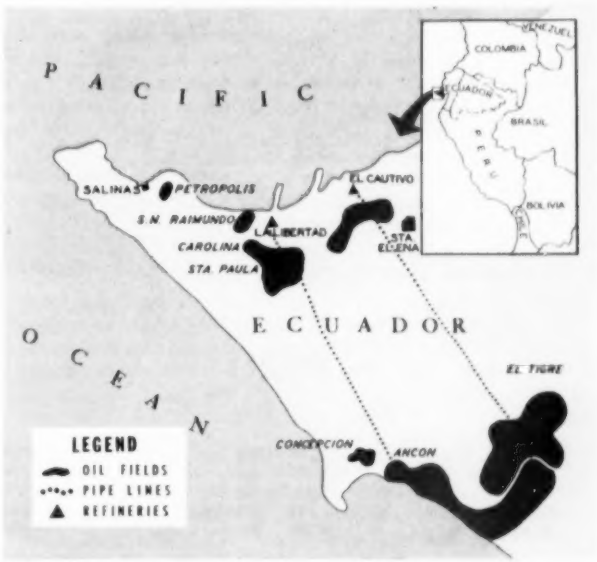
Colombia's network of product pipe lines was further extended with the construction of a 90-mile line from Puerto Salgar to Cantimplora. This line completed a system which allows movement of products entirely by pipe line from the Barrancabermeja refinery to Bogota. Last year, a line was built from Puerto Salgar into Bogota. Another new project this year was a products line from Puerto Berrio, also on the Magdalena River, to Medellin. Still under study was a line from La Dorada to Manizales and Cartago. These products lines are owned by various entities of the government.

Colombians have long hoped for an end to the situation whereby half the products requirements of the country (about 27,000 bbl. daily this year) are imported, although substantial amounts of crude oil are exported. The reason lies in the makeup of products from Barrancabermeja and in the fact that this refinery is not suited to supply the northern and western sections. Early this year, the Colombian Government set up a committee of industry and government officials to study the republic's over-all petroleum position. Among the recommendations of this group was one for construction of a refinery of 25,000-bbl.-daily capacity on the Caribbean Coast. The proposal was that the project be undertaken by private capital with government support. The committee also recommended that the government take every opportunity to encourage further exploration and development since new oil sources are necessary to prevent a production decline in a few more years.

ECUADOR

Area, sq. miles	**106,000**	**Ref. cap., B/D**	**5,700**
Population	**3,399,000**	**Prod., B/D**	**8,000**
Capital	**Quito**	**Number of fields**	**4**
Currency	**Sucre**	**Number of wells**	**1,091**
Value	**$0.0625**	**Reserves, bbl.**	**28,000,000**

MORE than 75 per cent of Ecuador's approximately 8,000-bbl. daily is produced by the British-owned Anglo-Ecuadorean Oilfields, Ltd., which carries on a small-scale integrated operation. The other principal com-



Ecuador . . . Domestic requirements rising.

ECUADOR PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data on prod. formation
Ancon[1]	1919	4,000-5,000	27	875		10			38	Eocene ss.
Santa Paula[2]	1934	800		53		1			29	Eocene ss.
Sn. Marco	1934	2,500	1	22		1			30	Eocene ss.
Tigre-Cautivo[3]	1917	700-3,500	3	110		1			37	Eocene ss.
Total Ecuador[4]			31	1,060		13	8,000	55,865,000		

(1) Anglo Ecuadorian Oilfields, Ltd., operates three natural-gasoline plants in field. (2) Includes Las Conchas. (3) Includes Ahuiquimi and other fields. Manabi Exploration Co. operates an absorption plant in field. (4) Estimated.

ECUADOR REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Anglo-Ecuadorian Oil Fields, Ltd., Casilla 410, Guayaquil	La Libertad	S	5,000		
Manabi Exploration Co., Inc., Apartado 4075, Guayaquil	Cautivo	S	700		
Total Ecuador			5,700		

pany is Manabi Exploration Co., Ltd., of Houston, which about 2 years ago bought from its British owners the properties of Ecuador Oilfields, Ltd. Three other companies—Carolina Oil Co., Petropolis Oil Co., and Conception Ecuadorian Oilfields—each have a production of a few hundred barrels daily.

The fields are located on Santa Elena Peninsula in an area about 90 miles west of Guayaquil. Fairly intensive exploration has been conducted in an effort to enlarge the production. Most successful work recently has been in the shallow Santa Tomas field. Anglo-Ecuadorean's 1952 output of 298,476 tons, or about 6,200 bbl. daily, was its highest since 1939-40, a result largely due to a southeast and a westward extension of Santa Tomas. A.E.O.'s No. 1046, brought in in September of last year, had produced 100,000 bbl. total up to May of this year when it was put on pump. In Ancon field, two deep tests by A.E.O. failed to find production. This year the company was drilling a deep exploratory hole about 10 miles south of the area in its northern concessions where a second test was abandoned after reaching basement at 4,598 ft.

Domestic requirements in Ecuador are rising rapidly, and production of the two small refineries now falls short of meeting internal demand. A.E.O. has reported that its gasoline imports were made at considerable financial loss because of the low level of government-controlled prices. A new collective contract was signed with the oil workers union in March of this year. Higher labor costs, coupled with increases in other items, have made adjustment in refined product prices imperative. No increases in these sales prices have been authorized by the government since 1948.

Although Ecuador has a petroleum law favorable to foreign capital, there has been no large-scale exploration outside the Santa Elena region since the Shell-Jersey Standard program in eastern Ecuador was abandoned 3 years ago after the expenditure of about $48,000,000.

PERU

Area, sq. miles	**482,258**	**Ref. cap., B/D**	**46,900**
Population	**8,863,000**	**Prod., B/D**	**42,370**
Capital	**Lima**	**Number of fields**	**9**
Currency	**Sol**	**Number of wells**	**3,034**
Value	**$0.06**	**Reserves, bbl.**	**250,000,000**

PERU ranks as the No. 1 country of new exploratory interest in Latin America. There are now some 20 companies active in the search for major production. Much of the exploration is of a long-range nature directed at finding large-scale reserves for export as well as domestic use. During the next few years, investments running into many millions will be poured into Peruvian oil exploration, and considering the geological factors, the prospects for success seem relatively good.

All this is taking place in a country which for many years held much of its prospective oil territory as national reserves unavailable for exploration. The change came March 12, 1952, when Peru's Congress, after years of consideration, passed a new petroleum law, at the instigation of the government. Initial applications from foreign companies were accepted the following October, and last January, an auction of overlapping filings gave the government around $2,500,000 in revenue.

Three Areas of Main Interest

There are three main sections of Peru of current exploratory interest. One is the Sechura Desert on the coast to the south of the Chira River. Another is the coastal region to the north of the Sechura area in which Peru's present producing fields are situated. The third is the Peruvian Montana east of the Andes Mountains.

Because of its accessibility and its geological promise, the Sechura attracted greatest interest in the initial concession filings. The region was completely covered and in many cases with overlapping applications. Twelve companies, eight of them foreign, are participating in the Sechura exploration. Largest holdings were acquired by International Petroleum Co., Ltd., which later added to its acreage by acquiring a half interest in the Sechura concession of the Canadian company, Seaoil, Ltd. Richmond, (Standard Oil Co. of California), Gulf through Peruvian Gulf Oil Co., and Conorado Petroleum Corp. also hold substantial Sechura concessions. Union Oil Co. took 40 per cent of the shares of the Peruvian-owned Petroleo Sullana and made an agreement with Conorado for its Sechura acreage. The first well to be drilled on a concession taken under the new petroleum law was commenced by International during summer about 41 miles southwest of Piura. International had previously done geophysical and geological work in the Sechura. Richmond also was preparing to spud in its first Sechura well, and other drilling by Union was scheduled to follow.

This year, the Peruvian Government opened up the

PERU PRODUCTION

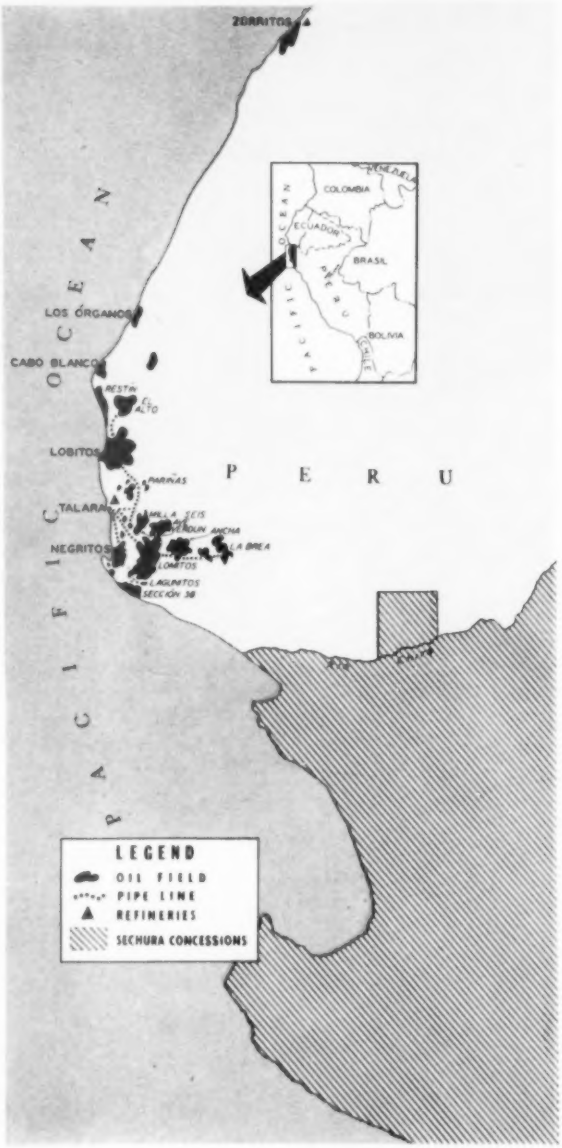
Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Agua Caliente	1938	1,200	4				(1)500	(1)1,291,000		
Cope	1938	650		6			16	150,225	34.6	Miocene sand
El Alto	1910	2,000	4	684	95	4	4,499	83,073,680	38.0	Eocene sand
La Brea Parenas	1888	3,000	209	1,684		9	29,200	351,449,000	36.6	Eocene sand
Lobitos	1902	4,500	62	198	57	6	5,510	(2)	38.3	Eocene sand
Los Organos	1946	1,500		82	5	4	1,163	(2)	34.7	Eocene sand
Organos	1943	2,000	5	61	2	2	1,448	1,530,125	42.4	Eocene sand
Punta Bravo	1940	2,400		2		1	5	3,555	36.2	Eocene sand
Zorritos	1863	2,000		33		2	29	3,611,343	36.8	Mio., Olig. sand
Total Peru			284	2,750	159	28	42,370	441,108,928		

(1) Estimated. (2) Included with El Alto.

PERU REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Cia. de Petrole Ganso Azul, Ltda., Lima	Agua Caliente	S	700		
Empresa Petrolera Fiscal, Lima	Zorritos	S	1,200		
International Petroleum Co., Ltd., Talara	Talara	S-C-L	(1)45,000	3,000	
Total Peru			46,900	3,000	

(1) Includes new facilities currently under construction.



Peru . . . No. 1 in exploration interest.

previously reserved Continental Shelf, but work obligations required in this offshore area discouraged possible applicants. Douglas Oil Co., a California firm, reached an agreement with the British-owned Cia. Petrolera Lobitos covering the Continental Shelf concessions in the Lobitos area. Douglas also took an option from the government company, Empresa Petrolera Fiscal, on about 20 miles of coast lying farther north. Peruvian Pacific Petroleum Co., a wholly owned Cities Service subsidiary, acquired rights on about 300,000 acres on the coast of northern Peru under contract with E.P.F.

Active drilling and development continued in the existing Peruvian producing areas, principally International's La Brea-Parinas Estate and the Lobitos concession area, where production is sustained by a fairly intensive drilling effort. Over the last few years, some additional production has been developed in a section between the Lobitos and International properties, and work is now taking place under a second joint development agreement between the two companies. E.P.F. has been carrying out an active workover and development program in its fields along the coast.

First foreign operator to apply for acreage in eastern Peru—where the new law allows lower royalty and other more favorable terms—was Texas Petroleum Co. which took out nearly 2,500,000 acres on the Maranon River, a branch of the Amazon. Similar large blocks were applied for by Richmond and by Peruvian Pacific (Richfield Oil Corp. participate in the latter company on a 50-50 basis with Cities Service). A group of United States companies, consisting principally of Texas Gulf Producing Co., Kendall Refining Co., and Bay Refining Co., bought the Ganso Azul properties in eastern Peru and resumed development drilling which had been suspended since 1947. The Ganso Azul group plans to supply crude to a small Brazilian refinery being built at Manaos on the Amazon and to a Peruvian Government plant being moved to Iquitos from the Pacific Coast.

VENEZUELA

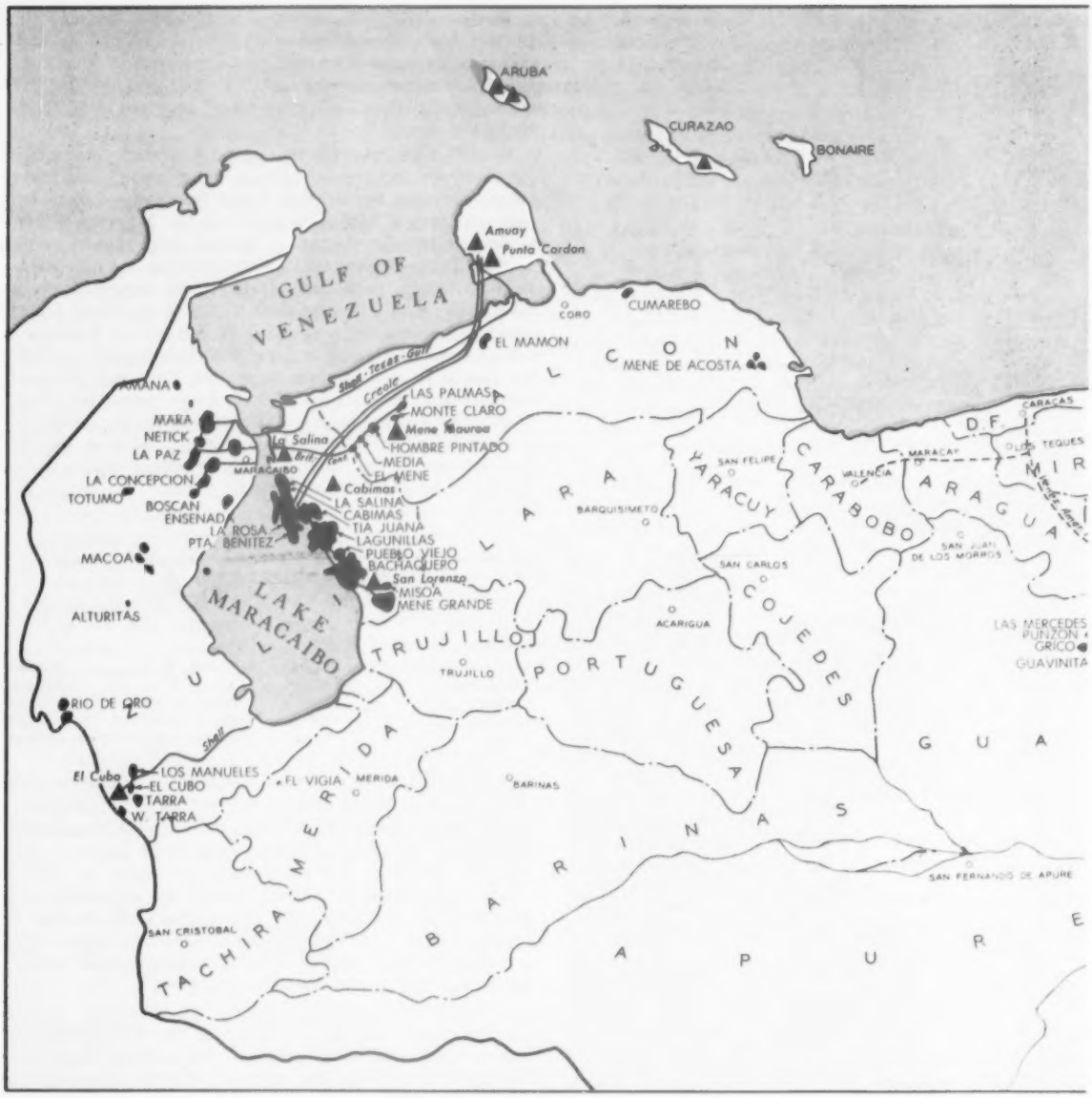
Area, sq. miles	**352,143**	**Ref. cap., B/D**	**453,000**
Population	**5,280,000**	**Prod., B/D**	**1,749,400**
Capital	**Caracas**	**Number of fields**	**82**
Currency	**Bolivar**	**Number of wells**	**7,867**
Value	**$0.301**	**Reserves, bbl.**	**9,900,000,000**

VENEZUELA'S petroleum industry is second in importance only to that in the United States. The republic is the world's largest oil-exporting country and stands as an outstanding example of the benefits of private, competitive enterprise. An enlightened oil policy has been continued without substantial change by succeeding administrations, and today the government's oil revenue is flowing into a variety of projects designed to improve the standard of living, such as schools, housing, public works, sanitation, and communications facilities.

Declines in production during the first half of this year have left the basic stability of the Venezuelan industry unaffected. Probably the outstanding single development has been the renewed consideration of the question of new concession grants. The Venezuelan press and public were debating the issue, and during the fall the government set up a commission to study the problem.

No new oil concessions have been granted in Venezuela since September 26, 1945, following the Accion Democratica revolution. At the present time, concessions are held on 15,502,776 acres representing 17 per cent of Venezuela's sedimentary basin area and about 6 per cent of the entire country. Of the total acreage, slightly more than 57 per cent is held by the three dominant companies —Creole Petroleum Corp., Shell, and Mene Grande Oil Co. Advocates of throwing open the country to new grants have argued that considerable oil capital which is interested in Venezuela is now moving into Peru and Canada, and that, furthermore, the policy of holding Venezuelan reserves for the long-term future is fallacious because of (1) the great reserves of the Middle East and (2) the possibility of development of other fuel sources such as atomic energy.

The 8 years that have elapsed since Venezuela last



Venezuela . . . This No. 2 country in world oil production has had outstanding oil field

VENEZUELA PRODUCTION

Eastern

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Apamate	1951	6,670	1	1			345	239,500	40.5	Mio., Olig., Eoc. ss.
Aragua[2]	1950	9,000	12	3	4		4,860	2,682,000	54	Oligocene ss.
Bella Vista	1952		6	16		1	945	187,300	35	Mio., Olig. ss.
Boca	1951	9,500	46	1	9		15,600	9,725,300	32.7	Oligocene ss.
Caico Seco	1946	6,500-7,300	26		19		8,958	4,586,700		
Cantaura	1952	10,630	1				97	13,900	42	Mio., Olig. ss.
Cerro Pelado	1941	4,400	1		2		55	31,000	35	Mio., Olig., Eoc. ss.
Chimire	1948	7,000-7,200	105	1	71	1	38,847	66,165,600	35.5-36.7	Mio., Olig. ss.
Dacion	1951	6,700	73	4	5	1	19,598	14,492,700	22	Oligocene ss.
El Roble	1939	8,040-11,560	28		4	1	4,803	23,120,400	58.5	Mio., Olig., Eoc. ss.
El Toco	1948	9,000	15		8		5,121	5,184,600	40.5	Mio., Olig., Eoc. ss.
Esquina	1951	4,360	1		2		513	316,800	41.5	Oligocene ss.
Fria	1948	6,500-7,300	10	4	4	1	2,388	2,530,900	34.5	Mio., Olig. ss.
Grico	1946	400-4,870	1		11		5	1,000		Cretaceous ss., ls.
Guara	1942	5,000-10,000	132	60	90	1	52,563	223,666,700	32.0-35.5	Mio., Olig. ss.
Guario	1940	5,000-10,000	19	4	24		8,860	20,231,700	44.4	Mio., Olig., Eoc. ss.
Guere	1951	7,800	26	3	5	2	7,988	3,986,700	39	Mio., Olig., Eoc. ss.
Guico	1944	4,500-7,000	24	29	17		9,828	38,652,400	34.7-38.0	Mio., Olig. ss.

development in Cretaceous west of Maracaibo; eastern Venezuela continues active.

VENEZUELA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Inca	1948	7,100	1		5		166	423,800	34	Mio., Olig. ss.
Jusepin	1938	3,000-5,300	146	78	210		18,636	144,576,300	32.5	Mio., Olig. ss.
La Ceibita	1953	9,871-9,878		1			17	500	36.8	Eocene ss.
Las Mercedes	1942	4,160-4,500	135	59	151	5	23,960	37,174,300	29.5	Mio., Olig., Eoc. ss.
La Vieja	1951	2,570	6	5	9		1,375	805,200	24.5	Mio., Olig., Eoc. ss.
Leona	1938	8,000	21	18	25		7,358	19,054,400	28	Mio., Olig. ss.
Los Mangos	1950	8,100			1		3	118,300	31	Mio., Olig., Eoc. ss.
Lobo	1952	6,400	6		3	1	328	59,400		Plio., Mio. ss.
Mapiri	1949	2,560	24		1	2	11,932	4,220,700	37	Miocene ss.
Mata	1951	11,520	7		3	2	2,085	656,000	34.5	Oligocene ss.
Mata Grande	1946	4,700	10	8	21		1,091	3,349,500	29	Mio., Olig. ss.
Merey	1937	5,700	6	2	12		1,707	1,334,100	17.5-20.5	Mio., Olig. ss.
Monal	1951	3,600			14		27	4,800		Mio., Olig. ss.
Motatan	1938	8,850			5	2	136	24,500		Eocene ss.
Mulata	1941	3,500-6,600	50	105	77		11,660	70,809,900	36	Mio., Olig. ss.
Muri	1942	4,500	9	33	16		1,179	13,739,200	27.5	Miocene ss.
Nipa	1945	6,000-8,500	104	21	44	1	27,023	70,848,300	35.5-38.5	Miocene ss.
Oficina	1937	5,900	140	153	155	3	57,768	223,072,000	35	Oligocene ss.
Orocual	1952	2,500	1		4	2	160	31,200	28.3	Mio., Olig. ss.

VENEZUELA PRODUCTION (Continued)

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Pedernales	1933	1,571	19		22	1	11,400	26,307,600	21.5	Miocene ss.
Pradera	1951	6,430	1	1			439	232,300	28	Mio., Olig. ss.
Pilon	1936	3,350			12	2	56	26,500		Mio., Olig. ss.
Punzon	1946	4,400	1		11	1	375	118,800	39.6	Mio., Olig., Eoc. ss.
Quiamare	1942	5,900-6,650	10		2	2	3,585	1,637,900	40	Mio., Olig. ss.
Quiriquire	1928	6,500-8,000	3	460	134	5	70,940	416,290,500	16.8	Pliocene ss.
Rincon Largo	1941	6,500-8,500	7		1		1,424	5,771,800	45.5	Mio., Olig., Eoc. ss.
Ruiz	1949	4,450	43	16	18	1	8,479	10,242,600	31	Oligocene ss.
Saban	1947	2,600	22	9	9	2	4,970	2,523,700	38.5	Mio., Olig., Eoc. ss.
San Joaquin	1939	6,560	46	4	27	2	12,091	6,614,200	42-45	Mio., Olig., Eoc. ss.
San Roque	1949	8,500	23	1	9		5,604	8,997,400	50	Oligocene ss.
Santa Ana	1936	8,500	20	1	14	2	10,035	10,391,700	39	Mio., Olig., Eoc. ss.
Santa Barbara	1941	5,000-6,500	95	82	85		9,135	78,394,300	31	Mio., Olig. ss.
Santa Rosa	1941	8,500	21		9	2	7,409	12,299,100	44	Mio., Olig. ss.
Soto	1949	9,500	52		20	5	30,133	16,851,300	35	Oligocene ss.
Tacata	1946	2,210			6		320	74,800	37.7	Miocene ss.
Tagua	1950	7,800	1				26	41,200	38.0	Oligocene ss.
Taman	1949	5,200	7	10	17		2,064	6,868,900	38.8	Mio., Olig., Eoc. ss.
Tapuco	1952	10,000-10,170	13		1		5,162	1,411,700	29.9	Mio., Olig. ss.
Temblador	1936	3,500-4,500	69		55	1	7,953	42,988,100	15-23	Mio., Olig. ss.
Tiguaje	1953	3,328-3,348	1				19	3,400	28.7	Eocene ss.
Trauieso	1944	4,000		9	2		184	1,146,000	27.5	Miocene ss.
Tucupido	1947	2,800-5,600	19	8	31		2,144	9,618,800	39.5	Mio., Olig., Eoc. ss.
Tucupita	1945	5,600	33		16		8,185	17,630,900	16.5	Miocene ss.
Yopales	1937	4,600	14	12	17		4,038	7,142,500	27	Mio., Olig. ss.
Total E. Venezuela			1,703	1,222	1,599	52	554,355	[1]1,689,693,900		
Western										
Alturitas	1950	12,040			1	1	7	12,100	19.6	Eoc., Cret. ss.
Bachaquero	1930	3,444	413	317	439	3	151,840	367,914,500	13.5-15.0	Mio., Olig., Eoc. ss.
Boscan	1946	6,500-7,500		32	61	2	15,767	20,768,300	10.5	Eoc., Cret. ss.
Cabimas	1917	2,200	155	725	774	2	87,079	719,437,600	15.6-22.0	Mio., Olig., Eoc. ss.
Chama Norte—1	1952	7,724	1		1	1	801	78,600	36.1	Mio., Olig. ss.
Cumarebo	1913	1,968	17	34	90	1	5,733	46,180,500	48	Miocene ss.
El Cubo	1916	984	31	108	121	2	20,514	132,791,800	34-41	Eocene ss., ls.
Ensenada	1948	8,850	1		4		330	364,400	57.1	Eoc., Cret. ss.
Hombre Pintado	1927	600-1,850		27	31		475	5,087,600	24.5	Oligocene ss.
La Concepcion	1935	3,148-8,000	5	59	88	2	10,242	40,801,900	36.5	Eoc., Cret. ss., ls.
Lagunillas	1926	3,000	362	1,199	776	12	431,428	2,297,098,200	24.5	Mio., Olig., Eoc. ss.
La Paz	1925	4,264-8,000	19	55	72	2	114,465	342,131,500	33.5	Eoc., Cret. ss., ls.
Mamon	1926	3,350	2		7		465	84,200		Miocene ss.
Mara	1945	5,248	18	21	45	4	63,095	150,052,200	30-32	Cretaceous ls.
Mene de Mauroa	1921	1,000		29	323		470	25,307,900	56.5	Oligocene ss.
Mene Grande	1945	4,132	9	427	298	1	47,422	387,492,400	17.8	Ter., Jur., Eoc. ss.
Oscurote	1953	9,513	4			1	157	29,000	26	Mio., Olig. ss.
Pueblo Viejo	1940	1,968	5	14	16		2,769	14,202,700	14-21	Mio., Olig., Eoc. ss.
Sibucara	1948	13,451	2		6	1	7,506	13,950,400	37.5	Eoc., Cret. ls.
Tia Juana	1928	3,000	202	593	501		234,482	859,092,900	12.6-31.1	Mio., Olig., Eoc. ss.
Total W. Venezuela			1,246	3,696	3,554	35	1,195,047	5,429,878,700		
Total Venezuela			2,949	4,918	5,153	87	1,749,402	7,119,572,600		

(1) Approximate. (2) Estimated.

VENEZUELA REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Compania Shell de Venezuela, Apartado 809, Caracas	Puerto Cardon	S-C-L	145,000	33,500	
	San Lorenzo	S	45,000		
Creole Petroleum Corp., P.O. Box 889, Caracas	Amuay	S-A	[1]84,000		(2)
	Caripito	S-C	70,000	42,000	
Mene Grande Oil Co., Caracas	Oficina field	S	1,000		
Phillips Oil Co., P.O. Box 1031, Caracas	San Roque	S-W	2,100		
Sinclair Oil & Refining Co., P.O. Box 1706, Caracas	Puerto La Cruz	S	35,000	(3)	
Socony-Vacuum Oil Co. of Ven zuela, P.O. Box 246, Caracas	Campo San Silvestre	S	120		
	Campo Guario	S	140		
Texas Petroleum Co., P.O. Box 267, Caracas	Tucupita	S	10,000		
The Colon Development Co., Ltd., Apartado 809, Caracas	Calvario	S	300		
	Casigua	S	1,000		
	La Rivera	S	300		
Venezuelan Gulf Refining Co., P.O. Box 709, Caracas	Puerto La Cruz	S-C	59,000	12,000	
Total Venezuela			452,960	87,500	

(1) Additional capacity of 74,000 bbl. daily planned. (2) Expansion plans include a 11,000-bbl. per day Hydroformer. (3) Refinery is arranged for visbreaking bottom product from distillation operation by utilizing topping unit, when operating in this manner, crude-oil throughput averages 18,000 bbl. daily.

granted concessions has allowed time for the conversion of all exploration acreage to the exploitation phase as provided under the 1943 oil law. Surface work is being carried out on free acreage where no concessions are required, and several other companies, among them Conorado Petroleum Corp., Superior Oil Co., and Cities Service Co., are expected to enter Venezuela if present policy is reversed and new concessions granted.

Along with decreased crude production, drilling activity has dropped off in Venezuela. During the first half of 1953, completions totaled 518, and estimated second-half completions were 530. This total for all of 1953 of 1,048 wells compares with 1,341 wells drilled in 1952. Of the first-half completions, 67 were exploratory holes, and of these 22 were oil wells, a success ratio of 30.5 per cent. Footage drilled during the first half amounted

to 4,144,916 ft., giving an average well depth during the period of slightly under 8,000 ft. Total footage of the estimated second-half wells was 4,241,150 ft. The decline in completions was reflected in the number of rigs operating. In September, these totaled 110, down 9 from the high for the year in February. Mene Grande was running 35 strings, Shell had 23, and Creole was third with 20.

Several new-field discoveries were made during the first half. These included Socony-Vacuum Oil Co. of Venezuela's Oscurote and La Ceibita, Texas Petroleum Co.'s Tiguaje, and Mene Grande's Siglo and Yagure. Exploratory drilling brought further eastward extensions of the Greater Oficina area with Venezuelan Atlantic Refining Co.'s Junta 2, Mene Grande's Nigua 1 and Zorro 1. Considerable interest was aroused in Sinclair Oil & Refining Co.'s Sinco 1 discovery in the Barinas area in southwestern Venezuela. Socony-Vacuum made a discovery in the same area several years ago but suspended development. The Barinas-Apure region is looked on as Venezuela's third great oil basin consisting largely of virgin territory, althought at considerable distance from the seacoast. The Shell organization, searching for additional prolific Cretaceous limestone production in the lake area, drilled the world's deepest hole outside the United States, LS-1387, which was abandoned at 17,537 ft. During the year Shell broadened its operations by reentering eastern Venezuela, and in western Venezuela, Colon Development Co., a Shell subsidiary, made a discovery at Rio de Oro near the Colombian boundary.

Good Conservation Practices

Operations of the oil companies in Venezuela are subject to laws and regulations administered by the Ministry of Mines and Hydrocarbons and its Technical Office of Hydrocarbons. Best conservation practices in the United States serve as a model for the Venezuelan officials and engineers connected with the government. Greater utilization of natural gas has long been a goal, although efforts in this direction run up against the basic lack of large heating and industrial markets such as are found in the United States. Use of gas for chemicals is being promoted, and it is eventually hoped the country's growing iron industry will provide a major outlet for gas fuel.

An increasing amount of Venezuelan gas is being taken in absorption and injection plants. During the first 6 months of this year, gas production in Venezuela averaged 1,983,897,000 cu. ft. daily, of which 78 per cent was flared. The amount flared during 1952 was 82.9 per cent. At the beginning of this year, seven additional injection plants and four absorption-type gasoline plants were planned. All these projects were by Mene Grande except for the Tia Juana repressuring program of Creole, which will take 214,000,000 cu. ft. daily. Creole now has under construction facilities to repressure Lagunillas field with about 150,000,000 cu. ft. daily.

Only pipe-line construction under way in Venezuela at the middle of this year consisted of nine short field-connecting lines being built by the various companies and totaling 51½ miles. A major trunk line was finished in Venezuela early this year by Creole Petroleum Corp. It was a 26-in. running from Lake Maracaibo to Paraguana Peninsula. Its completion gave three big-inch lines running out of the Lake Maracaibo basin. Formerly all like production was moved by shallow-draft tankers over the bar at the lake's mouth to Curacao or Aruba refineries or to transshipping terminals.

Refining capacity has expanded sharply since the end of the war. The construction carried out has considerably exceeded the 10 per cent domestic refining obligation provided in concession renegotiation after the 1943 law. Early this year, Shell completed a program bringing size of its Cardon refinery to 170,000 bbl. daily and making the plant the largest in Latin America aside from those at Aruba and Curacao. Creole began work recently on a project to double the size of its Amuay refinery.

Out of a total production in 1952 of 660,254,000 bbl. (1,804,000 bbl. daily), Venezuela exported 625,760,000 bbl., including 94,870,000 bbl. of products. More than 91 per cent of the oil exported went to Western Hemisphere destinations with the United States and the Netherlands Indies, together accounting for 73.3 per cent. Venezuela, which was able to pay off its foreign debts from oil income as far back as 1930, now derives 98 per cent of all foreign exchange and more than 60 per cent of total government revenue from the petroleum industry. The country ranks third among Latin American states in total value of trade.

TRINIDAD

Area, sq. miles	**1,864**	**Ref. cap., B/D**	**120,000**
Population	**611,000**	**Prod., B/D**	**56,820**
Capital	**Port-of-Spain**	**Number of fields**	**23**
Currency	**Dollar**	**Number of wells**	**2,047**
Value	**$0.59**	**Reserves, bbl.**	**285,000,000**

OIL production, which began in Trinidad in 1909, reached a peak during the war. In the last few years output has made small annual gains, and in the first half of 1953 the daily average of 60,900 bbl. was slightly above the 1944 previous high. In 1952, production averaged 58,082 bbl. daily. Per well output was 24.1 bbl., down 4 per cent from the previous year.

The gain in production has been accompanied by an increase in drilling activity. Although the average number of rigs operating was 27, down one from the 1952 average, 105 wells were started during the first 6 months of this year compared to 187 for all of 1952. Completions numbered 94 against 177 in 1952. First-half drilling

Trinidad . . . Small annual gains since war.

TRINIDAD PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Barrackkpore	1918	500-10,000					1,200		30	Mio., Olig. ss.
Brighton-Vessigny	1909	700-4,600					1,700		30	Mio., Olig. ss.
Coora	1936	170-8,550					2,900		37	Miocene
Cruse	1913	1,800-4,000					1,850		30	Miocene
Erin	1948	3,160-3,640					20		28	Miocene
Forrest Reserve	1914	100-8,000					14,100		24	Miocene ss.
Fyzabad	1920	300-8,000					8,400		34	Miocene ss.
Guapo	1921	1,500-5,700					2,300		17	Miocene ss.
Guayaguayare	1902	500-6,000					1,160		29	Miocene ss.
Los Bajos	1937	490-6,060					100		23	Miocene ss.
Mackenzie	1947	6,200-6,630					100		30	Miocene
Mandingo	1948	3,150-3,560					10		41	Oligocene ss.
Morne Diablo	1936	1,000-4,700					350		33	Miocene ss.
New Dome		1,000-2,500					70		26	Miocene
Palo Seco	1927	460-6,400					3,500		38	Miocene
Parrylands	1913	2,000-4,000							26	Miocene
Penal	1935	1,300-9,870					6,400		23	Mio., Olig.
Point Fortin	1908	1,000-7,825					8,000		20	Miocene
Quarry	1938	280-6,480					2,900		33	Miocene
Quinam	1936	1,000-4,300					300		34	Miocene ss.
San Francique	1922	1,000-2,800					250		23	Miocene ss.
Sunty	1951						10			
Wilson	1918	500-3,500					1,200		25	Mio., Olig. ss.
Total Trinidad			594	1,813		28	56,820	450,386,000		

(1) Estimates based on government report.

TRINIDAD REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Brighton Terminal, Ltd., 30 Rockefeller Plaza, New York 20, N. Y., U. S. A.	La Brea	S	5,000		
Trinidad Leaseholds, Ltd., Trinidad House, 29-30 Old Burlington St., London W. 1, England	Pointe-a-Pierre	S-C	85,000	[1]32,000	15,000
United British Oilfields of Trinidad, Ltd., 15 Ambercrombay St., Port of Spain	Point Fortin	S-A	30,000		
Total Trinidad[2]			120,000	32,000	15,000

(1) Includes thermal reforming (10,000 bbl. per day) and visbreaking (10,000 bbl. per day) capacity. (2) Small field plants operated by Apex Trinidad Oilfields, Ltd., and by Trinidad Petroleum Development Co., Ltd., not included.

footage totaled 426,695 ft., equaling an annual rate of 835,000 ft., compared to footage in 1952 of 736,535 ft., and in 1951, 664,887 ft. During the first 6 months, drilling averaged 2,359 ft. daily as compared to a daily average of 2,012 ft. in 1952.

Data from the Trinidad Petroleum Department show 16,925,039 M.c.f. of gas was produced during the first half of this year. Disposition of the gas showed little change. The amount returned to the formation represented 7.6 per cent as against 8.8 per cent in 1952, while the total vented or not collected was 32.4 per cent compared to 32 per cent last year. Fuel use took 50.1 per cent compared to 53.6 per cent in 1952. The third natural-gasoline plant in Trinidad was completed this year by Trinidad Leaseholds, Ltd., in Forest Reserve field.

Standard Oil Co. of California, which entered Trinidad in 1952 through a new West Indies subsidiary Dominion Oil Co., Ltd., conttinued surface work on its holdings which as of last April totaled 9,300,000 acres. United British Oilfields of Trinidad, Ltd., had further success in the Ortoire basin. Trinidad Northern Areas, Ltd., owned equally by Trinidad Leaseholds, U.B.O.T., and D'Arcy Exploration Co., Ltd., (Anglo-Iranian) continued preparations to drill a test in the Gulf of Paria by mid-1954. U.B.O.T. will be the operator.

Oil Found in Balata Area

United British Oilfields found oil in the Balata area and in small quantities in two wells in Catshill in the Ortorie basin. At last report it was not yet known whether the Balata discovery would prove to be commercial.

In a midyear report, U.B.O.T. said it had already spent about $5,300,000 in exploration surveys and test wells in the basin and that something very substantial in the way of oil reserves must be found before there is any solid prospect of the company recovering its investment.

Trinidad Leaseholds, the island's major refiner, placed additional facilities in operation at its 85,000-bbl. daily capacity refinery at Pointe-a-Pierre. A modernization program began in 1949 resulted in the completion of a 15,000-bbl.-daily fluid catalytic cracking unit in mid-1952. Facilities brought on stream this year included a diisobutylene plant and a sulfur-recovery unit. The company announced that late in the year it would begin producing sulfur, sulfuric acid, and chemicals for paints and plastics. A plant for the recovery of liquids from natural gas at the company's Forest Reserve field also was completed. Natural gas, both as refinery fuel and for secondary recovery, is of growing importance to the company. To reduce flaring even further, repressuring operations at Forest Reserve field have been expanded with additional compressor and gathering facilities.

In 1952, crude oil processed in Trinidad refineries amounted to 36,041,044 bbl. or an average of 98,800 bbl. daily. Of this, 72,200 bbl. daily was by Trinidad Leaseholds, 25,600 bbl. daily by U.B.O.T. at Point Fortin, 900 bbl. daily by Brighton Terminal, and the remainder in field topping plants.

The importance of the petroleum industry to the colony's economy was brought out in the annual 1952 report of the Petroleum Department. This showed that total disbursements of the industry last year in Trinidad were up 17.6 per cent to a total of $45,800,000. This consisted of $30,200,000 in wages, and $15,600,000 in revenue to the government. The amount going to the government made up 36.4 per cent of the government's total revenues.

NORTH AMERICA

ALASKA

Area, sq. miles	586,400	Population	140,000
Capital		Juneau	

THE search for oil in Alaska is being continued, but the area involved and the direction have completely shifted during the last year. For several reasons, one of which was the need for government economy, the Eisenhower administration called a halt to the exploration work which the U. S. Navy has been carrying out for the last 8 years in its Petroleum Reserve No. 4 bordering on the Arctic Ocean in northern Alaska.

At about the same time, Phillips Petroleum Co., in association with Kerr-McGee Oil Industries, Inc., obtained approval from the Department of the Interior of a development contract under which a 10-year program will be carried out over 1,100,000 acres in southern Alaska. Exploration in Alaska has been discouraged by the small size of leases permitted by federal law. The contract approved by the Interior Department allows unitized development of a block consisting of 505 separate leases which were assembled by William T. Foran and Ben G. Gellenbeck. The unitized development was strongly supported by territorial officials in Alaska itself.

During the fall, the companies began shipping equipment out of California to a temporary camp at the mouth of Carson Creek in Icy Bay. The equipment included a drilling rig to be used for the first of a series of wildcat tests called for under the contract. Several geological parties were at work in the field.

The area involved extends for approximately 120 miles along the shore of the Gulf of Alaska with the western boundary some 50 miles east of Cordova. The Phillips-Kerr-McGee program promised a thorough evaluation of the oil prospects of the region. The contract provides for the drilling of at least 12 exploratory wells over a 10-year period, 6 in the Yakataga district. Under the contract obligations, $1,200,000 must be spent for exploration before June 30, 1956, and a minimum sum equal to 40 cents an acre annually thereafter.

The now-terminated Navy program had long been regarded critically in industry quarters. Working through contractors and with the help of the U. S. Geological Survey, the Navy since 1944 had drilled 35 test wells and 41 core holes. Expenditures during the period totaled more than $50,000,000. The major result was the discovery of the shallow Umiat field on the Colville River where the drilling of 12 wells uncovered an estimated 50,000,000 bbl. of about 40°-gravity crude. Other discoveries were a small field in the Simpson area with an estimated 20,000,000 bbl. of highly viscous crude, two gas fields at South Barrow and Gubik, and four other possible gas fields. During the last few months of the year, the Navy's operation was gradually moved over to a caretaker status. Personnel were released, some equipment stored, and some sold.

Other activity of interest in Alaska included final U. S. Army plans for the construction of a 610-mile, 8-in. products line from Haines to Fairbanks. The line, which will primarily move products for military use, has been under consideration for several years. The go-ahead on the project came when the Canadian Government gave permission for the crossing of a part of British Columbia and the Yukon Territory. The route extends almost due east from Haines to the Alcan Highway and then follows the latter to Fairbanks. The construction will be carried out under two appropriations totaling $40,000,000.

MEXICO

Area, sq. miles	760,373	Ref. cap., B/D	243,500
Population	26,922,000	Prod., B/D	201,000
Capital	Mexico City	Number of fields	23
Currency	Peso	Number of wells	1,276
Value	$0.116	Reserves, bbl.	1,725,000,000

THROUGH Petroleos Mexicanos, the Mexican Government operates the largest state-controlled oil operation outside of the Communist world.

Pemex's principal problem is lack of capital. This was conceded by its director general, Sen. Antonio J. Bermudez, last August when in his annual report to the republic's president he said that the government com-

ALASKA PRODUCTION

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, A.P.I.	Geological data on prod. formation
Umiat	1950	700-1,500			7		(1)	(1)	36-37	Cretaceous ss.

1. Test production only.

MEXICO REFINING

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Petroleos Mexicanos, Av. Jurez 94, Mexico, D. F.	Arbol Grande	S-L-A	23,000		
	Atzcapotzalco	S-C	[1]52,000	[2]28,500	
	Ciudad Madero	S-C	[3]78,000	[2]18,000	(4)
	Mata Redonda	S-C	17,000	6,000	
	Minatitlan	S	[5]32,000		(6)
	Poza Rica	S	4,500		
	Reynosa	S	[7]7,000	(8)	
	Salamanca	Comp.	[9]30,000	14,000	
Total Mexico			243,500	66,500	

(1) Construction is under way to increase capacity to 61,000 bbl. daily. (2) Includes thermal cracking and Perco desulfurization. (3) Plans calls for increasing capacity. (4) Cat cracker, 20,000 bbl. per day, planned. (5) Plans considered for increasing capacity. (6) Cat cracker, 10,000 bbl. daily, planned. (7) Capacity scheduled for increase. (8) Cat cracker, 10,000 bbl. daily, planned. (9) Construction of additional capacity under way.

Mexico . . . has extended both ends of Golden Lane trend into new Continental Shelf discoveries.

MEXICO PRODUCTION
Oil Fields

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data on prod. formation
Arroyo Blanco	1952	2,700								Miocene ss.
Cuichapa-Acalapa	1934	4,900							30	Miocene ss.
Ebano District	1901	2,600							12	Cretaceous ls.
El Burro	1930	5,400							26	Miocene ss.
El Plan	1930	8,000							23-27	Miocene ss.
Filisola	1921	3,600							22	Miocene ss.
Fortuna Nacional	1949	7,300							29	Miocene ss.
Francisco Cano	1949	5,800							45	Oligocene ss.
Jose Colomo	1951	4,500							29	Miocene ss.
Moloacan	1948	2,200							25	Miocene ss.
Monterrey	1949	7,400							55	Oligocene ss.
Naranjos-Cerro Anzul Dist.	1908	2,600							20	Cretaceous ls.
Poza Rica Dist.	1930	8,500							30	Cretaceous ls.
Rabon Grande	1951	2,650							28	Miocene ss.
Reynosa	1948	7,100							61	Oligocene ss.
Tepa Nuevo	1928	1,750							36	Miocene ss.
Tonala	1928	4,300							28	Miocene ss.
Tortuguero	1950	4,200							36	Miocene ss.
Trevino	1947	6,700							61	Oligocene ss.
Condensate Fields										
Brasil	1948	8,000							55	Oligocene ss.
Mision	1945	8,050							38	Oligocene ss.
Reynosa	1948	7,100							61	Oligocene ss.
Valadences	1948	6,200							61	Miocene ss.
Total Mexico(1)			1,041	235	507		201,000	2,708,100,000		

(1) Official Petroleos Mexicanos records on production, unlike previous years, are not available for 1953 operations. Figures given here are estimates.

pany needed funds much more urgently than it needed oil. Early this year, Pemex's difficulty in this respect was aggravated by a general slump in export markets affecting the portion of its crude sold abroad. Mexican production, which had been averaging 220,000 bbl. daily recently, dropped back to around 185,000 bbl. daily.

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This reduction has curtailed foreign exchange earnings and income. In this the Mexican industry suffered from the same conditions that depressed Venezuelan production—lessening demand, particularly for the heavy fuel-oil crudes, high stock levels, and increasing use of lower-priced Middle East crude in many important markets.

Because of the pace of industrialization and a rapidly rising population, Mexican consumption increased at an average annual rate of about 10 per cent from 1945 through 1952. A growing proportion of the production has been required to supply domestic needs, and if present consumption trends continue, Pemex must further expand production, refining, and distribution facilities if Mexico is to retain its net volumetric self-sufficiency in oil. The investment funds that Pemex requires have been curtailed by the fact that it subsidizes other official agencies, particularly the state railways, with cheap fuels and also because sales price of motor fuel was for many years held at a low level.

A substantial part of Pemex effort since the end of the war has been channeled into pipe-line and refinery construction designed to reverse the emphasis of the industry which it took over in 1938. At that time, Mexican oil was primarily for export. Plants were located in the seacoast, and pipe lines led to tidewater terminals. Under Pemex, construction has been aimed at serving centers of consumption in Mexico itself. The Salamanca refinery, the enlargement at Atzcapotzalco the transisthmus pipe line, the building of the Reynosa refinery, all fit into this over-all plan.

At the present time, Pemex has a number of refining and distribution projects nearing completion, under way, or definitely planned. Capacity of the Atzcapotzalco refinery is being raised to 80,000 bbl. daily, and a 14-in. new pipe line will be laid from Poza Rica. When this is completed, the old line will be converted to carry butane and lighter fractions to the capital. The lubricating-oil plant at the Antonio M. Amor refinery at Salamanca is expected to go on stream early in 1954, and capacity of the refinery itself is being boosted to 40,000 bbl. daily. Increased capacity and a T.C.C. catalytic cracking unit are planned at the Minatitlan refinery which feeds the isthmus pipe line. The products lines leading out of the Salamanca refinery are being extended, and work is moving ahead on a gas line from Monterrey to Torreon, which eventually will reach Chihuahua City.

On the exploration side of the industry, the most important development in Mexico in many years was the 1952 discovery of Ezequiel Ordonez field, about 31 miles southeast of San Isidro field, formerly the southernmost producing area of the old Golden Lane. Five other field discoveries have been made on the trend between Ezequiel Ordonez and San Isidro. A 22-in. crude line is being laid to the terminal at Tuxpan. In May of this year, Pemex opened up a new oil province in the Veracruz basin when Angostura 2 was brought in testing 1,490 bbl. daily at a location 14 miles north-northeast of Tierra Blanca. In the Northern Zone, a small oil discovery was made southeast of Reynosa in what has become known as the Rio Bravo field, and extensions were made to Reynosa field. In the Isthmus and Tabasco zones, development drilling continued, and exploration work resulted in the discovery of new producing horizons at El Plan.

CENTRAL AMERICA, WEST INDIES, CUBA

CUBA

Area, sq. miles	**44,218**	**Ref. cap., B/D**	**7,700**
Population	**5,470,000**	**Prod., B/D**	**43**
Capital	**Havana**	**Number of fields**	**3**
Currency	**Peso**	**Number of wells**	**210**
Value	**$1.00**	**Reserves, bbl.**	**2,000,000**

PRESENT Cuban production of about 50 bbl. daily is negligible by world standards, despite the fact the republic has attracted exploratory interest in varying degrees for the last 40 years. According to incomplete reports to the Department of Mines of Ministry of Agriculture, the two fields in Las Villes Province, Motembo and Jarahueca, produced 3,682 and 4,085 bbl., respectively, during the first half of 1953, or an average of 43 bbl. daily. During the period January-August 1953, two wells were drilled in field CDB of the Jarahueca Estate, one to 893 ft. and the other to 2,499 ft. Both were abandoned. In Motembo during the same period, 11 wells were drilled, 4 of them small producers at depths varying from 990 to 1,682 ft. In addition, another 24 wells were abandoned, 22 because of depletion, 1 because of cavein, and 1 for unspecified causes. In the Bacuranao Estate, in the Guanabacoa Municipality, Havana Province, a wildcat test was reported to have had shows of oil.

Aside from these activities, a deep drilling venture by a group of Cubans was being organized. The Cuban Development Commission announced during the summer that it would turn over a government-purchased rig to the group, and a well, the first deep test ever drilled by Cuban independents, was scheduled near the Santa Clara-Camaguey boundary. Besides aiding this exploratory operation, the Cuban Development Commission was helping the Cabaiguan refinery increase its capacity to 1,000 bbl. daily.

CUBA PRODUCTION

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Bacuranao						1				
Jarahueca	1943	1,500		5			23		37-45	L. Cretaceous ls.
Motembo	1880	800		205			20			L. Cretaceous ls.
Total Cuba				210		1	43			

CUBA REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Esso Standard Oil Co., S. A., P.O. Box 1303, Havana	Belot	S-C-A	6,500	2,400	
Petrolea Jarahueca, S. A., Jarahueca	Jarahueca	S	200		
Refinadora Cabaiguan, S. A., Cabaiguan	Cabaiguan	S	1,000		
Total Cuba			7,700	2,400	

Running the string of Bethlehem carbon-manganese rods at Rufus Hardy Well No. 3, near Hempstead, Texas

Tapping the Earth at Raccoon Bend

The accompanying photographs were taken recently at the Rufus Hardy Well No. 3 in the Raccoon Bend Field, on the banks of the Brazos River, near Hempstead, Texas. The Rufus Hardy Well, owned and operated by the Falcon Seaboard Drilling Company, is producing 35-gravity oil from Sparta Sand at a depth of approximately 6300 ft. It is equipped with a Bethlehem 160D-20 pumping unit. The sucker-rod string consists of 1500 ft of ¾ in. and 4800 ft of ⅞ in. Bethlehem X2 Rods.

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Another view of the unloading operation, being supervised by Jimmy Hicks (center), field superintendent for Falcon Seaboard Drilling Company.

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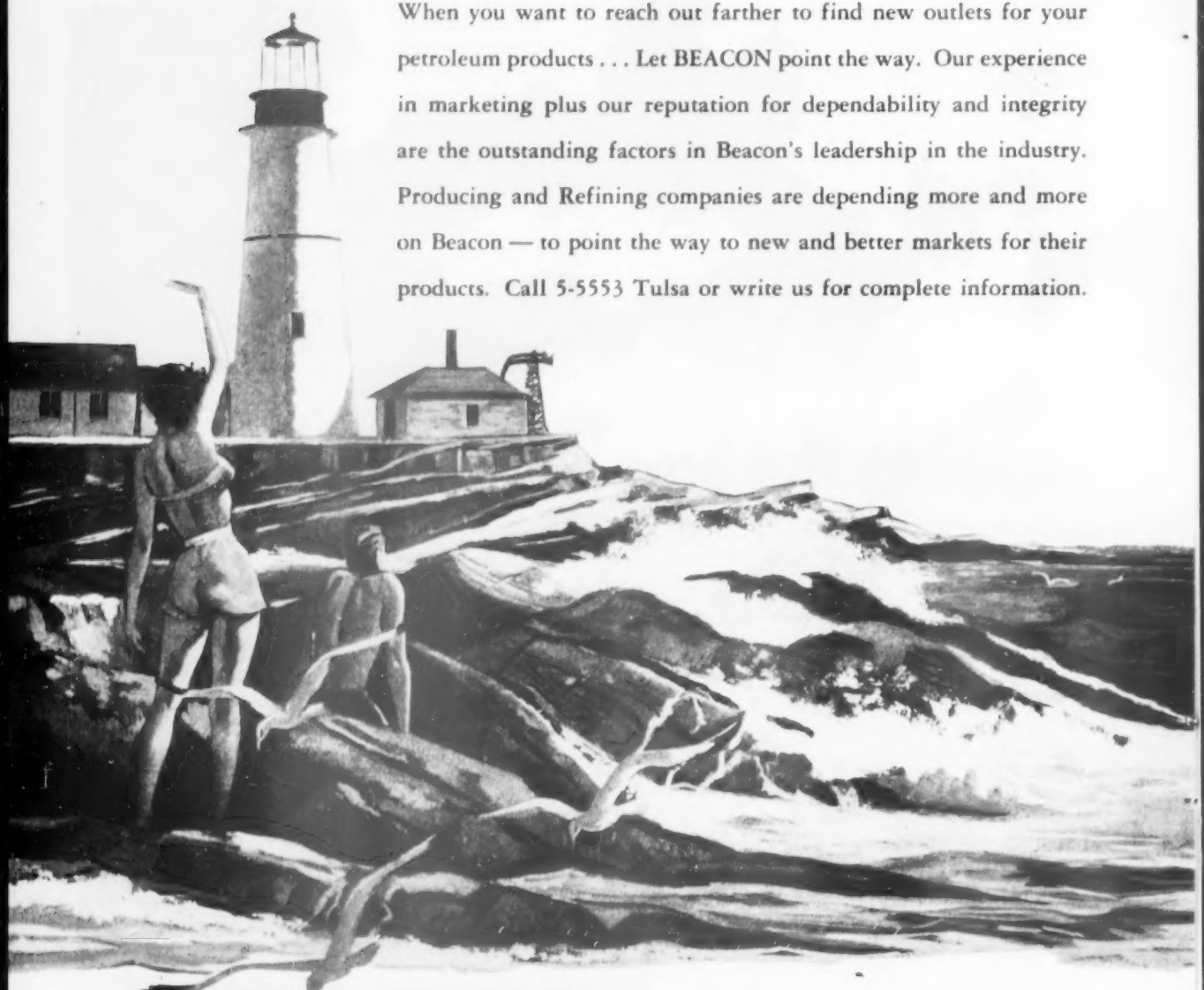

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The last deep test in Cuba was drilled in 1951 by Cuban Gulf Oil Co. off the north coast. The well, the company's second from a platform, was bottomed at 11,218 ft. in the Lower Cretaceous.

PUERTO RICO

Area, sq. miles	3,435	Population	2,216,000
Capital		San Juan	

Puerto Rico . . . Plans for the construction of a modern 10,000-bbl. daily refinery in Puerto Rico were finalized last spring. The plant will operate on Venezuelan crude and will include catalytic cracking and polymerization. It is being built by Caribbean Refining Co. stockholders which include Gulf Oil Corp., Cosden Petroleum Corp., Pontiac Refining Co., Emby Kaye, Tulsa consultant, and Ferre Industries of Puerto Rico. The refinery, situated near San Juan, is scheduled to be completed early in 1955.

BARBADOS (BRITISH)

Area, sq. miles	116	Population	209,000
Capital		Bridgetown	

Barbados . . . Barbados Gulf Oil Co. holds a prospecting license over about half the island. After surface work, the first well was started in January in St. Andrews Parish and late in the year was still drilling. The rig being used was shipped from Cuba following Gulf's second dry well off Cuba's north coast.

COSTA RICA

Area, sq. miles	19,695	Capital	San Jose
Population	850,000	Currency	Colon
Value		$0.179	

Costa Rica . . . Cia. de Petrolera de Costa Rica, a local company in which Union Oil Co. acquired controlling interest about 2 years ago, holds exclusive rights in the provinces of Limon and Guanacaste. Surface geology and aerial mapping were carried out last year, and seismograph work this year. The company has a drilling program planned to commence in 1954.

BRITISH HONDURAS

Area, sq. miles	8,867	Population	67,000
Capital		Belize	

British Honduras . . . Bahamas Exploration Co. (Gulf) holds an exploration license covering 12,443 sq. miles, including certain offshore areas. Further seismograph work is planned following the end of the rainy season early next year. Any drilling will not be before the latter part of 1954.

OTHER REFINERIES — WORLD-WIDE OIL REPORT

The tables which follow present information on refining activity in countries not included in the country-by-country discussion in the preceding pages.

ADEN

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Aden Petroleum Refinery, Ltd., Britannic House, Finsbury Circus, London, E. C. 2, England	Steamer Point[1]	S-C	120,000		12,000

(1) New refinery to be placed in operation in 1954.

ALBANIA

State-Owned Refineries	Kocova	S-A	1,600		

(1) Total estimated capacity of three small plants. A fourth plant, rated at 2,740 bbl. daily, is reported to be under construction near Cerrick. New plant is scheduled for operation in 1955.

BULGARIA

First Bulgarian Refinery Co.	Russe	S	900		
"Petrole" Co., S. A. B.	Russe	S	750		
Svetlina, S. A. B.	Russe	S	600		
Total Bulgaria[1]			2,250		

(1) Estimated.

CHINA

Official information on petroleum operations in China is not available. Latest reliable reports indicate one refinery is operating in Kansu province near the oil-producing area of Yumen in Communist China.

FORMOSA

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Chinese Petroleum Corp., 71 Goan Chyan Road, Taipei, Tiawan	Kaoshiung	S-C-A	15,000	2,000	

HAWAIIAN ISLANDS

Pacific Refiners, Ltd., Honolulu	Honolulu				

(1) Refinery operates on heavy crude oil mixed with butane which mixture is imported.

LEBANON

Company and address	Refinery location	Type of plant	Charging cap., bbl. per day: Distillation	Therm. crk.	Cat. crk.
Iraq Petroleum Co., Ltd., 214 Oxford St., London W. 1, England	Tripoli	S	10,000		
Mediterranean Refining Co., Beirut	Sidon	S-C	6,250	560	
Total Lebanon			16,250	560	

(1) New refinery scheduled of operation in 1954.

NETHERLANDS WEST INDIES

Lago Oil & Transport, Ltd., Aruba	Aruba	S-C	140,000	275,000	37,000
N.V. Curacaosche Petroleum Industrie, Mij., The Hague, Netherlands	Curacao	Comp.	200,000	118,000	
Total Netherlands West Indies			640,000	393,000	37,000

PHILIPPINE ISLANDS

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day—Distillation	Therm. crk.	Cat. crk.
Caltex (Philippines), Inc., Manila	Batangas	S-C	(1)		

(1) Under construction. Facilities include 13,000-bbl. per day crude unit, 5,400-bbl. per day cat unit and cat poly plant.

POLAND

Company and address— Former owner—	Refinery location	Type of plant	Charging cap., bbl. per day—Distillation	Therm. crk.	Cat. crk.
Fabryka Nafty "Waleryan Stawiarski" i Ska	Krosno	S	600		
"Jaslo" Industrial Oil Works Gartenburg & Schreyer	Jaslo	S-L	1,500		
Polskie Zwiaskowe Refinerije Olejow Stalnych, S. A.	Trzebionka	S	2,500		
Societe Francaise Industrielle et Commerciale des Petroles	Jedlicze	S-L	1,500		
	Glinik Mariampolski	S-L	1,200		
Standard Nobel w Polsche, S. A.	Libusza	S-L	1,100		
Total Poland[1]			8,400		

(1) Three war-damaged plants in Polish area totaling 2,400 bbl. per day have not been returned to operational status and their restoration is believed not contemplated. A new 7,000-bbl. per day refinery is thought to be under construction at Trzebinia. Figures on Polish refining operations are estimates.

SOUTH AFRICA

South African Torbonite Mining & Refining Co., Ltd., Boksburg North	Boksburg North	(1)			
Standard Vacuum Refining Co. of South Africa, Pty., Ltd., P.O. Box 956, Durban	Durban	S-C-A	17,300	2,000	6,300
Total South Africa			17,300	2,000	6,300

(1) Crude oil obtained from retorting shale oil. Refinery operates a 2,000-bbl. per day thermal cracker.

SWITZERLAND

Industrie du Petrole, S. A., Rotkreuz	Rotkreuz	S-C	4,000	1,000	

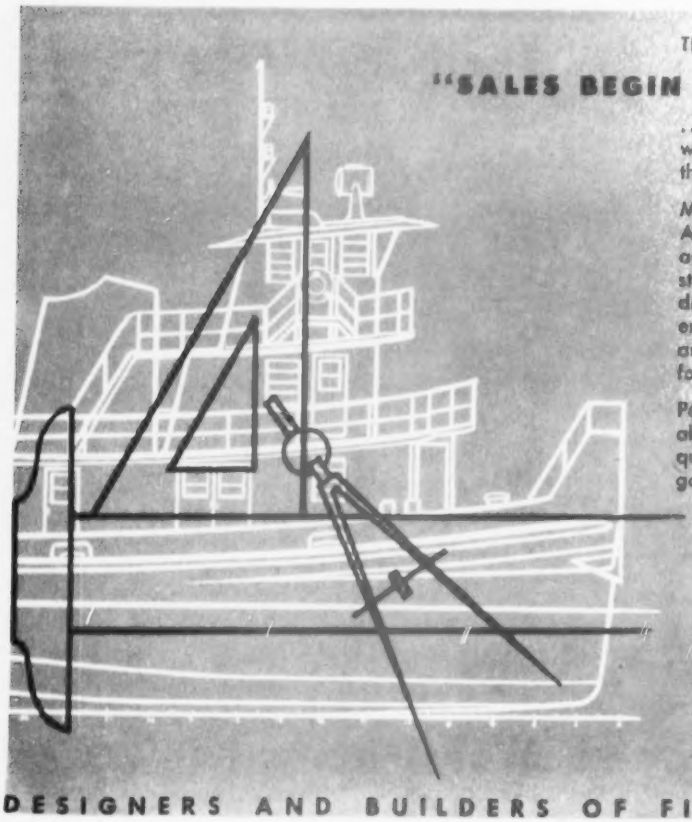
UNITED STATES

The Oil and Gas Journal's Survey of United States refineries as of 1953 shows 320 operating plants. Total crude-oil input rating on these plants is 8,090,283 bbl. per day. Capacity on thermal operations including cracking, reforming, visbreaking and related operations is 2,564,035 bbl. daily for the 320 refineries. Combined processing capacity for catalytic operations in these operating refineries is 3,067,337 bbl. per day. A list of United States refineries as of January 1, 1953, was published in the Journal's Annual Refining issue, March 23, 1953.

URUGUAY

Ancap La Teja, Casilla de Correo 1090, Montevideo	La Teja	S-C-A	28,000	(1)	7,000

(1) Currently, the refinery's 2,000 bbl. per day thermal cracking unit is operating in distillation service processing virgin crude oil.



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Ad 503

DEMAND FOR CRUDE AND ITS PRODUCTS . . .

Free World—Table 1
(Thousands of barrels daily)

Year—	Demand	Increase over previous year: Volume	Increase over previous year: Per cent
Actual:			
1947	8,092		
1948	8,645	553	6.8
1949	8,975	330	3.8
1950	10,096	1,121	12.4
1951	11,190	1,094	10.8
1952	11,698	508	4.5
*1953	12,485	787	6.7
Outlook:			
1954	13,062	577	4.6
1955	13,548	486	3.7
1956	13,946	398	2.9

*Partly estimated.

United States Domestic—Table 2
(Thousands of barrels daily)

Year—	Demand	Increase over previous year: Volume	Increase over previous year: Per cent
Actual:			
1947	5,452		
1948	5,775	323	5.9
1949	5,803	28	0.4
1950	6,507	704	12.1
1951	7,041	534	8.2
1952	7,281	240	3.4
*1953	7,738	457	6.3
Outlook:			
1954	8,055	317	4.1
1955	8,288	233	2.9
1956	8,479	191	2.3

*Partly estimated.

DEMAND AND SUPPLY OUTLOOK . . .

Demand Will Increase, But at Slower Pace

Consumption in free countries abroad up 7.4 per cent in 1953

TOTAL demand of the free countries of the world, shown in Table 1, will amount to nearly 12,500,000 bbl. per day for 1953, an increase of 750,000 bbl. per day or 6.7 per cent over 1952. This table also portrays that the outlook is for continued upward trend in demand during the coming 3 years, but that a lower rate of growth is anticipated. The petroleum industry, however, must provide during each of these years incremental supplies of approximately 400,000 to 600,000 bbl. per day in order to meet the additional world demand.

U. S. demand outlook . . . Total domestic demand for crude and products in the United States for 1953 is expected to reach a level of about 7,750,000 bbl. per day, an increase of 457,000 bbl. per day or 6.3 per cent as compared with 1952. This is considerable improvement over the gain made in 1952 of only 240,000 bbl. per day or 3.4 per cent. In this connection, however, it should be remembered that industrial production in 1952 as a whole showed no gain compared with an expected growth of 8 per cent for 1953. Also, the milder weather (in 1952 vs. 1951) reduced the consumption of heating oils. The outlook is for continued upward trend in consumption in the United States during the coming 3 years, although a lower rate of growth is presently foreseen.

Foreign-demand outlook . . . Total demand for crude and products in the free countries abroad is expected to approach 4,750,000 bbl. per day, an increase of 330,000 bbl. per day or 7.4 per cent over 1952—an improvement over the rate of growth of 6.4 per cent in 1952. The outlook for demand in foreign countries during the next 3 years is for continued growth but lower rates of gain are anticipated as compared with the past 5 years. The substantial increase in demand indicated

The British oil industry's exhibit in the Thames River pageant held last summer during the coronation festivities. (Courtesy Anglo-Iranian Oil Co.)

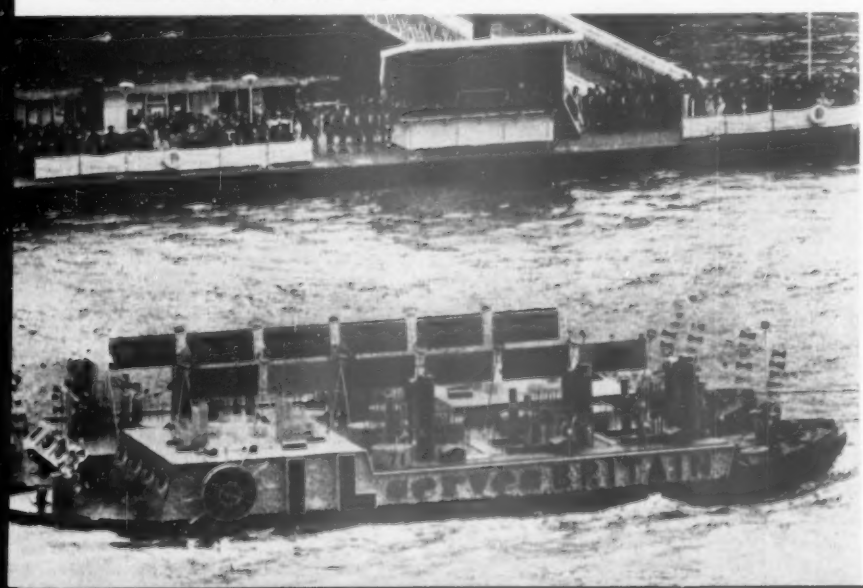


TABLE 3—WORLD DEMAND BY PRODUCTS
(Excluding U.S.S.R. and Satellite Countries)
(Thousands of barrels daily)

	Actual year 1952						Outlook year 1956					
	United States domestic		Foreign countries local*		World		United States domestic		Foreign countries local		World	
	Demand	Per cent of total	Demand	Per cent of total	Demand	Per cent of total	Demand	Per cent of total	Demand	Per cent of total	Demand	Per cent of total
Gasoline (incl. avgas)	3,154	43.3	1,164	26.4	4,318	36.9	3,680	43.4	1,477	27.0	5,157	37.0
Middle distillate	1,651	22.6	1,052	23.8	2,703	23.1	1,984	23.4	1,336	24.5	3,320	23.8
Residual fuel oil	1,519	20.9	1,860	42.1	3,379	28.9	1,642	19.3	2,220	40.6	3,862	27.7
Lubricants	104	1.5	87	2.0	191	1.6	111	1.3	103	1.9	214	1.5
Other products	836	11.5	214	4.8	1,050	9.0	1,039	12.3	276	5.0	1,315	9.4
Total products	7,264	99.8	4,377	99.1	11,641	99.5	8,456	99.7	5,412	99.0	13,868	99.4
Crude as such and loss	17	0.2	40	0.9	57	0.5	23	0.3	55	1.0	78	0.6
Total demand	7,281	100.0	4,417	100.0	11,698	100.0	8,479	100.0	5,467	100.0	13,946	100.0

*Foreign local demand by products partly estimated.

TABLE 4—FOREIGN LOCAL DEMAND—CRUDE AND PRODUCTS
(Excluding U.S.S.R. and Satellite Countries)
(Thousands of barrels daily)

Year—	Demand	Increase over previous year	
		Volume	Per cent
ACTUAL:			
1947	2,640		
1948	2,870	230	8.7
1949	3,172	302	10.5
1950	3,589	417	13.1
1951	4,149	560	15.6
1952	4,417	268	6.4
1953*	4,747	330	7.4
OUTLOOK:			
1954	5,007	260	5.4
1955	5,260	253	5.1
1956	5,467	207	3.9

*Partly estimated.

TABLE 6—WORLD SUPPLY—CRUDE AND ALLIED PRODUCTS
(Excluding U.S.S.R. and Satellite Countries)
(Thousands of barrels daily)

Year—	Production	Increase over previous year	
		Volume	Per cent
ACTUAL:			
1947	8,033		
1948	9,078	1,045	13.0
1949	9,002	—76	—0.8
1950	10,078	1,076	12.0
1951	11,418	1,340	13.3
1952	11,893	475	4.2
1953*	12,431	538	4.5
AVAILABILITY‡			
OUTLOOK:			
1954	14,941		
1955	15,348	407	2.7
1956	15,748	400	2.6

*Partly estimated. ‡Includes Iran for each year at 760,000 bbl. daily.

TABLE 5—WORLD PETROLEUM DEMAND BY AREAS
(Excluding U.S.S.R. and Satellite Countries)
(Thousands of barrels daily)

	Actual demand					Outlook for demand					
			% inc.		% inc.		% inc.		% inc.		% inc.
Local demand by areas—	1951	1952	vs. '51	*1953	vs. '52	1954	vs. '53	1955	vs. '54	1956	vs. '55
United States	7,041	7,281	3.4	7,738	6.3	8,055	4.1	8,288	2.9	8,479	2.3
Other North America	649	710	9.4	760	7.0	808	6.3	853	5.6	895	4.9
Caribbean†	408	445	9.1	465	4.4	481	3.4	498	3.5	513	3.0
Other South America	390	411	5.4	441	7.3	472	7.0	501	6.1	525	4.8
Total Western Hemisphere:											
(Excluding United States)	1,447	1,566	8.2	1,666	6.4	1,761	5.7	1,852	5.2	1,933	4.4
(Including United States)	8,488	8,847	4.2	9,404	6.3	9,816	4.4	10,140	3.3	10,412	2.7
O.E.E.C. countries—Europe	1,433	1,548	8.0	1,657	7.0	1,743	5.2	1,813	4.0	1,869	3.1
Other Eastern Hemisphere—West of Suez	347	354	2.0	379	7.1	397	4.7	414	4.3	427	3.1
Total Eastern Hemisphere—West of Suez	1,780	1,902	6.9	2,036	7.0	2,140	5.1	2,227	4.1	2,296	3.1
Middle East	290	271	—6.6	278	2.6	282	1.4	287	1.8	290	1.0
Far East, South and East Africa and Oceania	632	678	7.3	767	13.1	824	7.4	894	8.4	948	6.0
Total Eastern Hemisphere—East of Suez	922	949	2.9	1,045	10.1	1,106	5.8	1,181	6.8	1,238	4.8
Total Eastern Hemisphere	2,702	2,851	5.5	3,081	8.1	3,246	5.4	3,408	5.0	3,534	3.7
Total foreign	4,149	4,417	6.4	4,747	7.4	5,007	5.4	5,260	5.1	5,467	3.9
Total world	11,190	11,698	4.5	12,485	6.7	13,062	4.6	13,548	3.7	13,946	2.9

*Partly estimated. †Includes Colombia, Netherlands, Antilles, Trinidad, Venezuela, and West Indies.

SEASON'S GREETINGS

H C Smith OIL TOOL CO.

TABLE 7—WORLD PETROLEUM SUPPLY—PETROLEUM CRUDE-OIL AND ALLIED PRODUCTS PRODUCTION
(Excluding U.S.S.R. and Satellite Countries)
(Thousands of barrels daily)

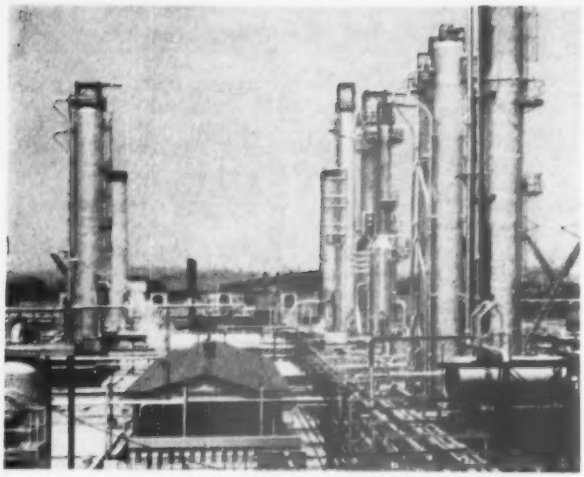
	Actual production					Outlook for availability of supply				
	1951	1952	% inc. vs. '51	*1953	% inc. vs. '52	1954	1955	% inc. vs. '54	1956	% inc. vs. '55
CRUDE OIL:										
United States	6,158	6,262	1.7	6,386	2.0	§7,305	§7,504	2.7	§7,753	3.3
Other North America	344	379	10.2	430	13.4	620	680	9.7	738	8.5
Caribbean	1,867	1,968	5.4	1,910	—3.0	2,167	2,167		2,167	
Other South America	124	127	2.4	133	4.7	133	132	—0.8	136	3.0
Total Western Hemisphere:										
(Excluding United States)	2,335	2,474	6.0	2,473	—0.1	2,920	2,979	2.0	3,041	2.1
(Including United States)	8,493	8,736	2.9	8,859	1.4	10,225	10,483	2.5	10,794	3.0
O.E.E.C. countries—Europe†	47	57	21.3	65	14.0	75	77	2.7	79	2.6
Other Eastern Hemisphere—West of Suez	50	51	2.0	53	3.0	46	45	—2.2	44	—2.2
Total Eastern Hemisphere—West of Suez	97	108	11.3	118	9.3	121	122	0.8	123	0.8
Middle East	1,934	2,085	7.8	2,422	16.2	‡3,493	‡3,565	2.1	‡3,615	1.4
Far East, South and East Africa and Oceania	277	298	7.6	322	8.1	348	380	9.2	376	—1.1
Total East of Suez	2,211	2,383	7.8	2,744	15.1	3,841	3,945	2.7	3,991	1.2
Total Eastern Hemisphere	2,308	2,491	7.8	2,862	14.9	3,962	4,067	2.7	4,114	1.2
Total foreign	4,643	4,965	6.9	5,335	7.4	6,882	7,046	2.4	7,155	1.5
Total world	10,801	11,227	3.9	11,721	4.4	14,187	14,550	2.6	14,908	2.4
NATURAL GAS LIQUIDS, etc.:										
United States	562	606	7.8	646	6.6	686	726	5.8	766	5.5
Foreign	55	60	9.1	64	6.7	68	72	5.9	74	2.8
Total World	617	666	7.9	710	6.6	754	798	5.8	840	5.3
TOTAL SUPPLY:										
United States	6,720	6,868	2.2	7,032	2.4	7,991	8,230	3.0	8,519	3.5
Foreign	4,698	5,025	7.0	5,399	7.4	6,950	7,118	2.4	7,229	1.6
Total world	11,418	11,893	4.2	12,431	4.5	14,941	15,348	2.7	15,748	2.6

*Partly estimated. †Excludes Austria. ‡Iran included at 700,000 bbl. daily. §Excluding Elk Hills Naval Reserve.

TABLE—9—CRUDE-OIL REFINING CAPACITY
(Excluding U.S.S.R. and Satellite Countries)
(Thousands of barrels daily)

	Actual refining capacity*					Outlook for refining capacity*					
	1951	1952	% inc. vs. '51	1953	% inc. vs. '52	1954	% inc. vs. '53	1955	% inc. vs. '54	1956	% inc. vs. '55
United States	7,149	7,552	5.6	7,936	5.1	8,250	4.0	8,500	3.0	8,700	2.4
Other North America	592	661	11.7	703	6.4	783	11.4	802	2.4	821	2.4
Caribbean	1,341	1,372	2.3	1,411	2.8	1,439	2.0	1,459	1.4	1,489	2.1
Other South America	221	229	3.6	232	1.3	340	46.6	369	8.5	379	2.7
Total Western Hemisphere:											
(Excluding United States)	2,154	2,262	5.0	2,346	3.7	2,562	9.2	2,630	2.7	2,689	2.2
(Including United States)	9,303	9,814	5.4	10,282	4.8	10,812	5.2	11,130	2.9	11,389	2.3
O.E.E.C. countries—Europe	1,208	1,538	27.3	1,772	15.2	1,907	7.6	1,991	4.4	1,991	
Other Eastern Hemisphere—West of Suez	177	205	15.8	219	6.8	222	1.4	228	2.7	228	
Total Eastern Hemisphere—West of Suez	1,385	1,743	25.8	1,991	14.2	2,129	6.9	2,219	4.2	2,219	
Middle East†	902	933	3.4	984	5.4	984		984		984	
Far East, South and East Africa and Oceania	303	430	41.9	434	0.9	468	7.8	684	46.2	789	15.4
Total East of Suez	1,205	1,363	13.1	1,418	4.0	1,452	2.4	1,668	14.9	1,773	6.3
Total Eastern Hemisphere	2,590	3,106	19.9	3,409	9.8	3,581	5.0	3,887	8.5	3,992	2.7
Total foreign	4,744	5,368	13.2	5,755	7.2	6,143	6.7	6,517	6.1	6,681	2.5
Total world	11,893	12,920	8.6	13,691	6.0	14,393	5.1	15,017	4.3	15,381	2.4

*Yearly average. †Abadan refinery included at 525,000 bbl. daily.



Absorption plant in Poza Rica field in Mexico.

TABLE 8—WORLD REFINING CAPACITY
(Excluding U.S.S.R. and Satellite Countries)
(Thousands of barrels daily)

Year—	Throughput	Increase over previous year	
		Volume	Per cent
ACTUAL:			
1947	8,482		
1948	9,290	808	9.5
1949	10,173	883	9.5
1950	11,021	848	8.3
1951	11,893	872	7.9
1952	12,920	1,027	8.6
1953*	13,691	771	6.0
OUTLOOK:			
1954	14,393	702	5.1
1955	15,017	624	4.3
1956	15,381	364	2.4

*Partly estimated.

for "Far East, South and East Africa, and Oceania" area may be attributed primarily to the large volume of demand in Japan reflecting conversions from the use of coal to oil. The outlook in the Far East area is for a substantial percentage increase in demand as compared with other areas for the years 1954-1956, inclusive. Increasing consumption of oil in this area may be accounted for to some extent by additional refinery use due to new plants being erected in Aden, India, and Australia.

World-supply outlook . . . The tables pertaining to supply of crude oil and allied products indicate that actual production for the year just closing will very likely reach a level closely approaching total world demand. These tables also reflect the fact that the industry has successfully accomplished the task of meeting not only the very large increases in world demand following the outbreak of the Korean war, but also the development of crude-oil productive capacity to replace the loss to the free world of supplies from Iran.

World refining-capacity outlook . . . Table 8 points up the fact that during the year 1953 there was substantial growth in crude-oil refining capacity in the countries of the free world and that the outlook for the next 3 years is for continued expansion.

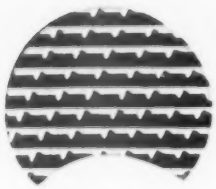
From Table 9 it is to be noted that all areas show a rise in refining capacity for the year 1953 vs. 1952. The large percentage increase in 1954 shown for "Other South America" reflects substantial expansion in refining capacity in Argentina and Brazil. For 1955 and 1956, large increases are also indicated for the "Far East, South and East Africa, and Oceania" area which may be attributed largely to new plants now being erected in Aden, India, and Australia. During the past postwar years most of the expansion of foreign refining facilities has been made in Western Europe. The outlook is for a shift in the expansion from this area to other parts of the world, that is, to countries east of Suez and in South America.

Observations and Conclusions

During the postwar years and especially the period following the outbreak of war in Korea and after the loss of supplies from Iran, the major task confronting the world petroleum industry was to build up sufficient crude productive capacity and refining facilities to meet unexpected large world demand. The accompanying statistical tables indicate that the industry has successfully met its task to date. In an effort of this magnitude, there was always the danger that the industry would overshoot its objective and that overexpansion and overproduction would bring about inefficiency, physical and economic waste, and thereby undesirable controls and regulations by national governments.

TABLE 10—FOREIGN CRACKING CAPACITY BY AREAS
(Excluding U.S.S.R. and Satellite Countries)
(Thousands of barrels daily)

	Actual			Outlook					
	1952	1953	% Inc. vs. '52	1954	% Inc. vs. '53	1955	% Inc. vs. '54	1956	% Inc. vs. '55
North America (excl. U. S.)	216	249	15.3	288	15.7	301	4.5	309	2.7
Caribbean	267	274	2.6	289	5.4	289		289	
Other South America	68	68		108	58.8	115	6.4	115	
Total Western Hemisphere (excl. United States)	551	591	7.3	685	15.9	705	2.9	713	1.1
O.E.E.C. countries—Europe	204	307	50.4	387	26.1	412	6.4	412	
Other Eastern Hemisphere—West of Suez	12	12		12		12		12	
Total Eastern Hemisphere—West of Suez	216	319	47.7	399	25.1	424	6.3	424	
Middle East	140	140		140		140		140	
Far East, S. & E. Africa and Oceania	59	59		75	27.1	118	57.3	125	5.9
Total East of Suez	199	199		215	8.0	258	20.0	265	2.7
Total Eastern Hemisphere	415	518	24.8	614	18.5	682	11.1	689	1.0
Total foreign	966	1,109	14.8	1,299	17.1	1,387	6.8	1,402	1.1



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Camel Trails Across Desert Sands, Caravans of

Heavy Trucks and King-Size Trailers . . .

. . . these spell exploration logistics in Saudi Arabia

by Burt Beverly and O. A. Seager

IN the geological exploration of Arabia, many varied types of surface and near-surface conditions have been encountered. This has required the use of most of the conventional tools of the geologist including surface mapping, aerial photography, gravity meter, magnetometer, structure drill, and seismograph, in order to get a proper understanding and interpretation of the geology of the concession area.

Authors are with the exploration department, Arabian American Oil Co., Dhahran, Saudi Arabia.

As in any exploratory operation carried on in nonindustrial countries, logistics play a paramount role. This has been especially true in the Arabian concession, an area some 500 km. wide by 2,300 km. long, with terrain varying from treacherous coastal tidal flats to the interior homocline of highly dissected limestone rocks, and with much of the area covered by moving dune

Structure drill party . . .

. . . Sets up camp. Tents are provided with electricity

sand. During the early days of exploration the few roads which did exist were but slightly improved camel trails.

It was soon discovered that the camel trails, in use for centuries, followed the easiest routes both to the interior and north-south along the coast. Road drags, constructed specifically for the terrain conditions, and pulled by D-8 Caterpillar tractors, were utilized on these old camel trails to make them more suitable for automotive equipment. Access roads were then opened for the main supply routes. In general, transportation is not difficult when traveling parallel to the prevailing wind, as dragged trails tended to remain open. Across grain it is another story, as the sand soon drifts across these routes.

Initial surveys . . . One of the early tasks for the geologists was to establish a geodetic net to control the various geological surveys and later, the development drilling operations; and for the construction of geographic maps. Existing maps were a compilation of traveler's accounts and Persian Gulf charts, and were dependable only so far as the coast lines were concerned.

The geodetic net was started in 1935 from an initial point near Dhahran. Since then it has been constantly expanded as the exploration is extended farther into the interior and into the great sand desert of southern Arabia, the Rub al Khali. Base maps are prepared on a scale of 1:100,000 with topography shown by the hachure system, utilizing modified standard symbols developed to depict the Arabian terrain. Formerly, all maps were the result of geologists' reconnaissance and semidetail mapping. At present, new areas are being covered by photogrammetry and original maps in the areas of development are being revised by the same method.

Oil discovered . . . Exploration of the Saudi Arabian concession was started in the fall of 1933 by California Arabian Standard Oil Co. Later, in 1944, the name of the company was changed to Arabian American Oil Co.

Exploration results in Saudi Arabia were soon successful. Dammam Dome was proven productive from Middle Cretaceous, in 1936, and from the main producing formation, the Upper Jurassic Arab zone during 1938. New oil discoveries continued with Abu Hadriya in 1940; Abqaiq in 1941; Qatif in 1945; Ain Dar in 1948; Fadhili and Haradh in 1949; 'Uthmaniyah and Safaniya in 1951. *(See "Exploration Gets Results in Saudi Arabia" by D. B. Eicher and M. P. Yachel, The Oil and Gas Journal, December 20, 1951).* Recently Ain Dar and 'Uthmaniyah have proved to be one accumulation and the regional pasturage name for the area, Ghawar, has been adopted as the field name.

The first exploration personnel to arrive in the country landed at Oqair, which was then official point of entry on the Persian Gulf, and the eastern terminus of camel caravan trails to the interior. Immediately to the west of Oqair the dunes of the Jafura sands begin, and occupy 80 per cent of the 75 km. to Hofuf, the provincial capital.

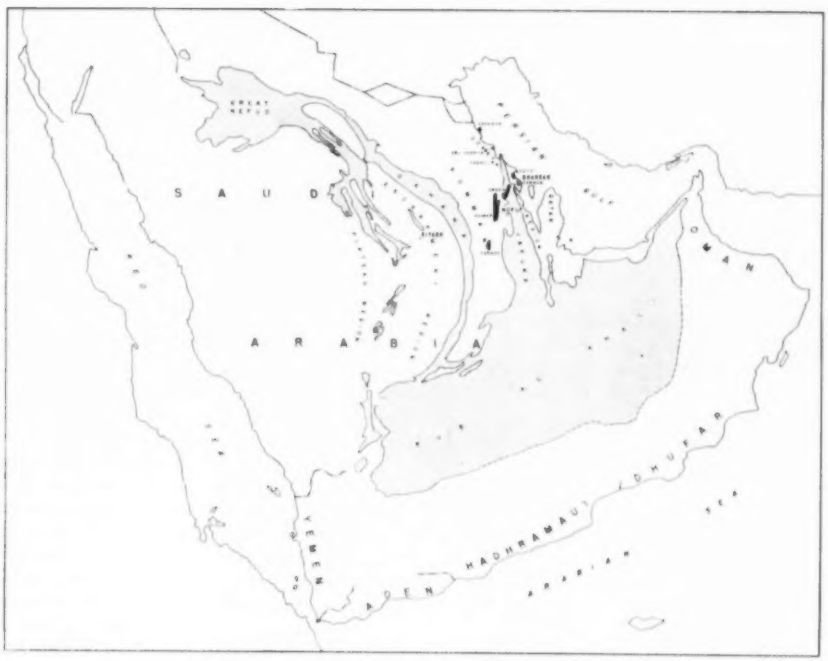
Automotive Transport

The vehicles used by the initial party were Ford V-8 touring cars with 6:00 by 16 tires, and Ford Warford 6 by 4 trucks, with 7:50 by 20 tires. These vehicles proved incapable of traversing the Jafura sand, and only with the aid of gangs of laborers, camels, and reed mats, was the convoy able to arrive at Hofuf several days later. The touring cars could negotiate the level sands areas with difficulty, and dune sands were impassable for them. This experience made it evident that mobility of automotive equipment would have to be improved if exploration was to be conducted with this means of transportation.

Mobility acquired . . . In the summer of 1934, the Egyptian Camel Corps demonstrated a 9:00 by 13 tire, operating at low pressure. Light vehicles equipped with these tires negotiated the level sand area with ease and were able to traverse the camel trails through the dune areas. The adoption in 1936 of truck equipment with all-wheel drive was another step forward. In 1937, R. C. Kerr, of Arabian American Oil Co., and Col. A. W. Herrington, president of Marmon-Herrington Co., fitted the 2½-ton 6 by 6 trucks with 11:00 by 16 low-pressure tires. The results were immediately successful, and all subsequent heavy-duty transportation units have been engineered for and equipped with low-pressure tires properly powered for difficult road work.

One of the most versatile small vehicles in field service is the 1-ton-capacity four-wheel-drive Dodge Power Wagon. As originally set up, this vehicle is equipped with 9:00 by 16 tires with the provision for using duals if desired. Very early in the operations

Physiographic Provinces of Saudi Arabian Operations



THE area of operations of the Arabian American Oil Co. in Saudi Arabia is divided into a number of physiographic provinces, briefly described as follows:

Persian Gulf Coastal Region

The shore line from Kuwait on the north to the Trucial Coast on the south is irregular, and anchorages are few, due to the saline flats (Sabkhas), sand spits and shoals. Bordering this irregular coast from the latitude of Jubail southward, is a belt of active sand dunes, 30 to 120 km. wide. This sand belt often rests on a gravel surface, and with intervening Sabkhas near the sea, is frequently treacherous and impassable. This is the locale of the Fadhili, Qatif, Dammam, and Abqaiq oil fields.

From the latitude of Oqair and Hofuf southward, and several miles inland, is an eastern-facing escarpment. From Abqaiq southward, the sand belt known as the Jafura rapidly widens and merges into the great Rub al Khali (Empty Quarter). This sand area can be traversed only with difficulty by vehicles equipped with low-pressure sand tires. Northward from Jubail the terrain consists of more or less stabilized low rolling sand ridges often with a sparse covering of small bushes and bunch grass. This land form is known as Dikaka.

Travel over dikaka is not difficult, but is slow due to the hummocky nature of the surface. No part of the coastal region is more than a few hundred feet above sea level, but the country rises gradually toward the interior, at a rate of about 1 m. per km.

Summan Plateau

Between the coastal strip described above, and the great belt of sand known as the Dahana, there is a plateau area 80 to 250 km. wide. In most places the Summan is a dissected limestone plateau, frequently covered with dikaka, and gradually grading into gravel plains both to the north and south. To the north this belt continues into the rocky desert of Iraq, and to the south narrows, as the Jafura widens, until it loses its identity under the sands of the Rub al Khali.

Dahana

Inland from the Summan is one of the most distinctive geographic features of Saudi Arabia, a belt of reddish sand, some 1,300 km. long, and 25 to 75 km. wide. This extends from the Great Nefud on the north to the Rub al Khali on the south. To the north the sands are in general stabilized, and dikaka and limestone surfaces are common. Consistently there is a sinuous band of active sand, on both the western and eastern limits of the Dahana. To the south the sands are more active and moving dunes are common. The Dahana, at an average elevation of about 450 m., supports considerable grass during the winter and early spring months, and is a grazing ground for the camels and sheep of the Bedouin.

Escarpment Region

West of the Dahana is an area some 320 km. wide with a series of west facing ridges generally known as the Aruma and Tuwaiq Mountain escarpment. The elevation of the Tuwaiq Mountain escarpment is approximately 840 m., with higher areas approaching 1,150 m. Several major wadis (dry valleys except during the infrequent rains) which cut across the strike of the Tuwaiq Mountain escarpment afford routes of travel into the interior of the country. The areas between the various escarpments are often filled with stabilized to moving sands. The topographically low area between the Tuwaiq Mountain escarpment and the Central Plateau region, to the west, contain some of the larger nefuds (sand areas) of Arabia.

Central Plateau

The Central Plateau in general ranges in height from 1,150 to 1,350 m., with local areas around 900 m. and some higher than 1,800 m. The surface is composed of metamorphic and igneous rocks of the basement complex.

Great Sand Areas

The Rub al Khali is in the southern part of Arabia. It lies between the southern Tuwaiq Mountains and the highlands of Yemen on the west, the Hadhramaut and Dhofur plateau and mountains on the south, and the Oman Mountains on the east. The Rub al Khali, an area some 1,200 km. long and 650 km. wide, is one of the largest continental bodies of sand in the world, and is unexplored except for the margins and the central northern and western portions. Extending northward from the Rub al Khali, in an arcuate pattern, are the Dahana and Jafura sand bodies described previously. The Dahana extends into the Great Nefud, also reddish in color, somewhat elliptical in shape, and covers an area of approximately 57,000 sq. km.

Airplane tire gives amazing performance for desert truck travel

in the sand areas it was found that single tires always gave better results than duals, provided a large enough tire could be installed. Accordingly, these units were mounted with 11:00 by 16 six-ply sand tires. The resulting performance was good in most of the sand areas. However, in certain very soft, fluffy sands it was possible for this vehicle to become bogged down, and to be extricated only with considerable difficulty.

Since these very soft sands were not widespread in some of the earlier areas being explored, it generally was possible to avoid them in the course of the field work. A few years ago, however, when the first serious penetration into the Rub al Khali was made, it became apparent that relatively large areas of soft sand would have to be traversed in the normal course of the field work. Casting about for still larger tires for this vehicle, it was found that the 16:00 by 16 tire of the DC-3 airplane would fit the Power Wagon rim. On installation of a set of these airplane tires, the performance of this vehicle was amazing. It could negotiate the windward slope of any sand dune under full load and could stop and start at any point on the slope. It could do down the leeward slip face of the dune with safety, but could not climb up the 30° slip face. As a result of these field tests, a special 17:00 by 16 six-ply sand tire was fabricated and this vehicle has been able to travel with ease over all of the sands so far encountered in the Rub al Khali.

The Power Wagon is used in various capacities. With an express body, it serves as a conveyance for survey crews and structure drill drillers. Equipped with a stake bed, it can deliver light loads of supplies quickly and safely over difficult terrain. With special bodies, it serves as a seismograph recording unit and as an electric-logging unit for the structure drills. Mounted with a winch and A-frame, it is used as a mechanic's service car.

Oddly enough, it was found that the Power Wagon equipped with these large tires was able to traverse difficult rocky areas formerly considered almost impenetrable. Areas strewn with limestone boulders, a foot or more in diameter, were easily overriden by the large tires. Furthermore, the soft sidewalls and low pressure permitted the tire to give way easily, thus preventing in a large measure, the cuts and abrasions from the sharp rocks.

For additional details in the development of automotive transport in Arabia, see article by R. C. Kerr, "Automotive Transport in Saudi Arabia," S.A.E. national transportation meeting, October 16-18, 1950.

Logistics System

The conduct of the exploration and development in the Arabian concession has been and is dependent on an integrated logistics system. All geological field work is administered and directed from the company's headquarters at Dhahran. Here the exploration division maintains a supply center for specialized equipment and operates a field radio circuit which is in contact twice daily with the field parties. Regular weekly aircraft flights are sheduled for personnel exchange, mail, and emergency supplies for all large parties which operate at a distance of more than ½-day by car from headquarters.

During the summer months of June, July, and August, all field activities are at a standstill because of the severity of the weather. It is during this period that field reports are prepared, personnel take time off, and all automotive vehicles, drills, and other specialized equipment are given the annual overhaul and necessary replacements are made.

One of the major problems of supply is the transportation of water, fuel, food, and miscellaneous bulky and heavy materials for the large exploration parties such as seismograph, structure drill, and gravity-magnetometer. Water for drilling usually is obtained from wells drilled at strategic locations and hauled in 2,500 to 6,000-gal. semitrailer tankers. Distances from the wells to the operation vary with the terrain and the difficulty of completing wells, and may be as great at 150 km. The occurrence of good water is spotty and it is sometimes economic to supply drinking water from Dhahran. Gasoline and diesel fuel are transported in 4,000 and 6,000-gal. semitrailer tankers from nearest bulk station. The prime movers for these long-distance heavy hauls are Kenworth Model 853 tractor trucks. This is an all-wheel-drive unit with a tandem rear axle designed for dual low-pressure sand tires (14:00 by 20 and 18:00 by 24) and powered so as to maintain over-all steady cross-country speeds for high degree of flexibility with minimum gear shifting under high ambient temperatures.

Chilled and frozen foods, canned goods, and dry commissary items are supplied to the parties on a 10-day schedule by a mobile commissary which also services the remote drilling operations and pipe-line stations.

Travel . . . The establishment of temporary air strips for flights to the field parties requires little work, as satisfactory landing areas usually can be found within a few kilometers of a field camp. Even in the northern and western Rub al Khali landing areas have been established at intervals which place the strips within about an hour's driving time of the camp. Frequently, all that is necessary to prepare a strip is to mark the runway. In the gravel-covered areas, about 12 round trips with a tractor truck and trailer will mark the surface so as to be recognizable from the air.

Travel, except between permanent installations or on established roads, is controlled by a rigid check-out and check-in system reporting departures, route of travel, and arrivals by radio. Reconnaissance and offroad travel is always with two vehicles and generally one of the two vehicles is equipped for radio communication. Repair kits and small, frequent replacement items, such as fuel and water pumps and fan belts, as well as extra gasoline, water, and food are standard equipment in offroad cars. Considering the nature of the country, the distances involved and the frequently severe weather conditions, there have been few times when it has been necessary to send out search parties for personnel who have not arrived at their destinations. Most trouble has occurred during or after periods of sand storms or late in the field season when the sands become very soft because of their extreme dryness, and the vehicles are suffering increased failures.

Field Camp Design

One of the typical geological exploration field parties that has been successfully operating in Arabia is the structure drill unit.

This unit consists of two structure drill rigs working out of one field camp. Usually the work is organized so that the drills do not work a distance of more than 45 km. from the camp. The camp is designed to be mobile so that it can be moved readily and keep within a reasonable commuting distance of the two rigs.

Three camp trailers are provided. These are built on a 30 to 35-ft. semitrailer chassis and the bodies are 10 ft. wide. The running gear is a single axle mounted with 14:00 by 20 dual sand tires. Normally the front end of the semitrailer is supported by a single-axle dolly with a fifth wheel, and the three trailers are towed in a train between camp sites by a tractor, truck, or a D-8 Caterpillar tractor. One trailer is a utility unit in which are mounted

(Continued on page 241)

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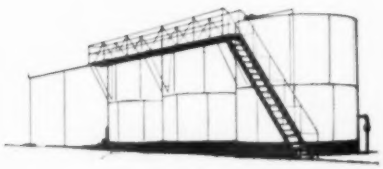

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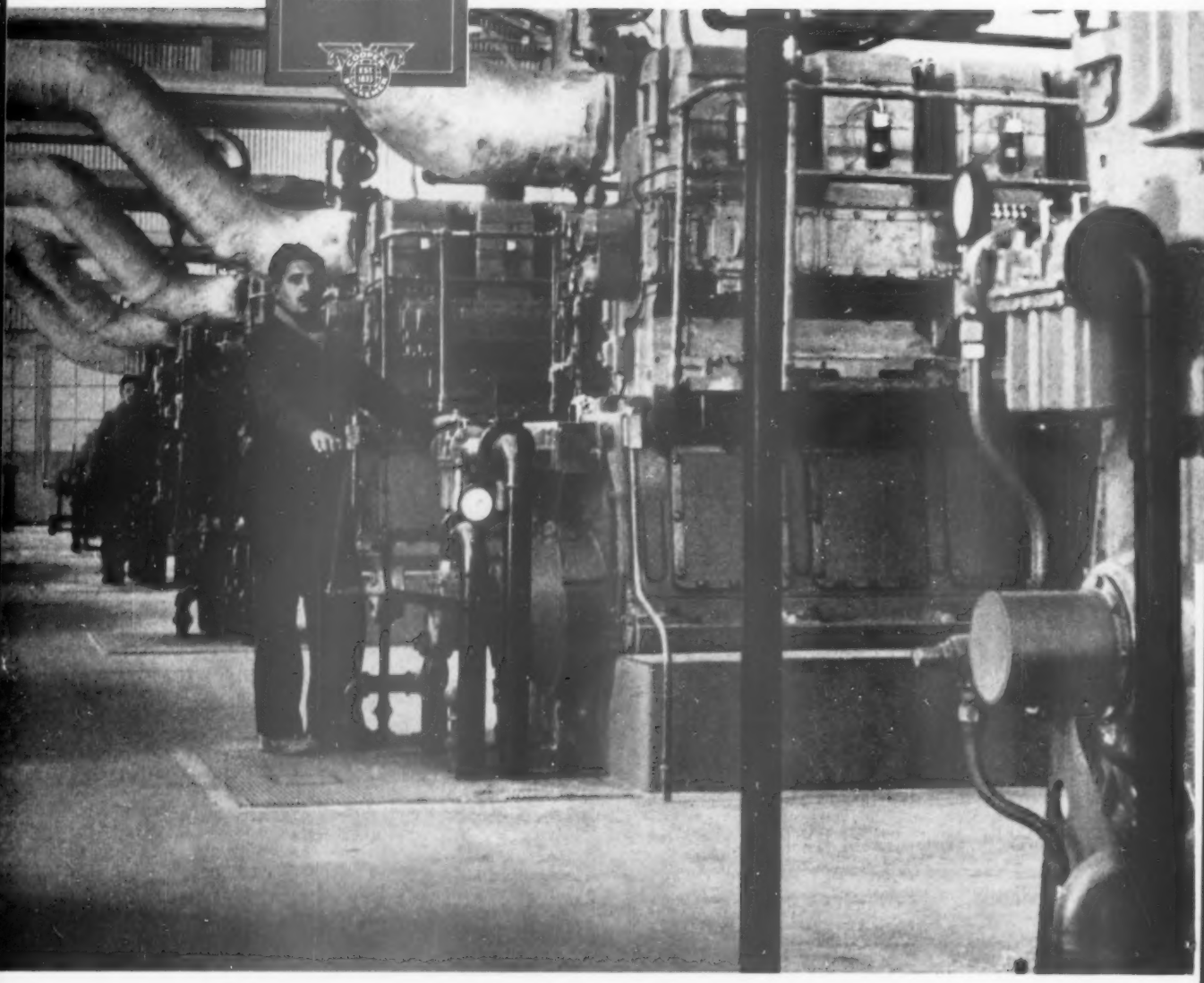

Cooper-Bessemer 675 bhp JS-8 spark-ignited gas engines driving centrifugal pumps in the gathering center at the Kuwait oil fields.

Two Cooper-Bessemer Gas-Diesel engines are shown driving 125 kw alternators for generating service in the pumping station at Kuwait.

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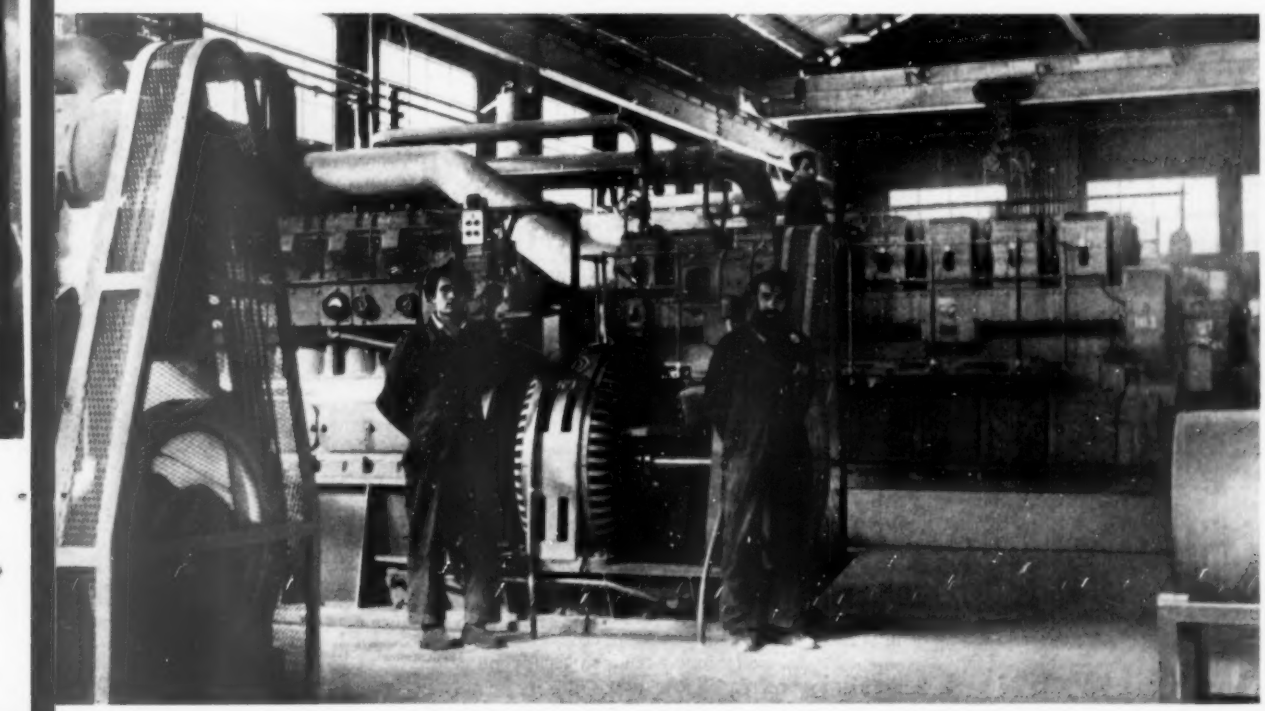
AT KUWAIT

BECAUSE of its rich oil fields, the small Arab Sheikhdom of Kuwait at the head of the Persian Gulf, has recently gained world-wide importance.

Cooper-Bessemer JS-8 gas engines were chosen to power the original field pumping units at Kuwait which transfer the crude oil to the shipping tanks at Ahmadi. Additional Cooper-Bessemer Gas-Diesel engines drive generators for lighting and for powering the gathering centers' electrically driven auxiliaries.

In this desert area where shade temperatures rise to 120°F during the summer season, reliable, trouble-free power is a prime necessity. That is why Cooper-Bessemers were chosen for the job.

Full gas operation, oil, Gas-Diesel, or quick conversion . . . you will find Cooper-Bessemer units of the size and type you need, ready to give top performance and unmatched economy.



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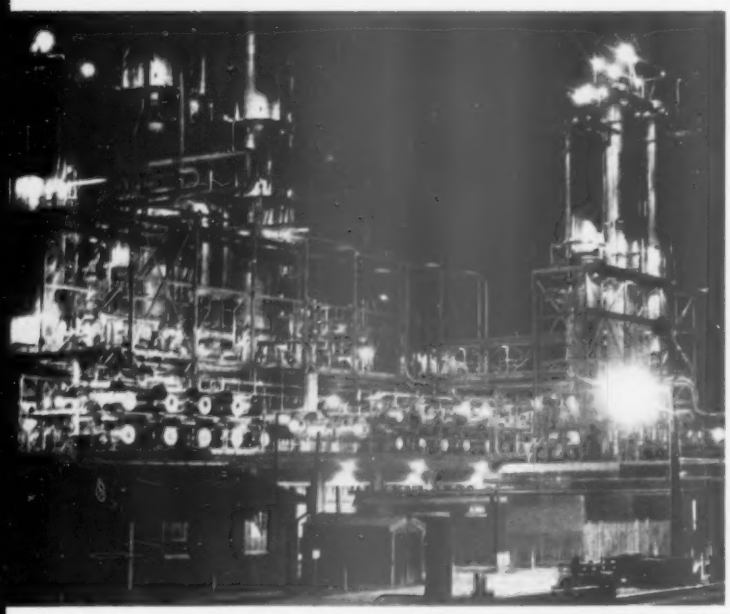
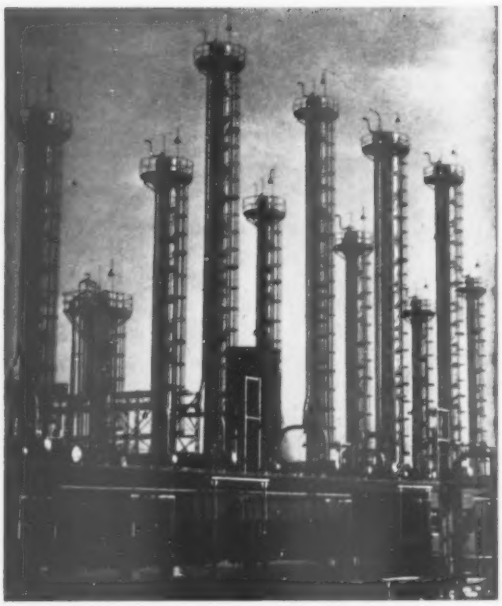


Crude distillation and high-vacuum distillation units at Stanlow refinery. This refinery is located near Ellesmere port, Cheshire, England.



New Shell Chemical plant at Stanlow, showing distillation unit.

Shell's Stanlow Plant Boasts Many "Firsts"

- First cat cracker in United Kingdom
- First to recover elemental sulfur from cracked gases
- First to construct a hydrodesulfurization plant
- First to erect a Platforming unit

Special-products unit at Shell Chemical plant, Stanlow. Tower in foreground is part of diacetone alcohol section. Other columns are part of mesityl oxide section.

THE Shell Refining & Marketing Co. operates four refineries in the United Kingdom, which together produce 10 million long tons of petroleum products a year (approximately 75,000,000 bbl. per annum) from crude oil imported mainly from the Middle East. These refineries are located in different parts of the country to insure the most efficient distribution of their products. Stanlow, in Cheshire, starting in 1922 as a tankage installation from which finished products imported from overseas refineries were distributed through the United Kingdom, has grown since World War II into one of the largest and most complete installations in Europe.

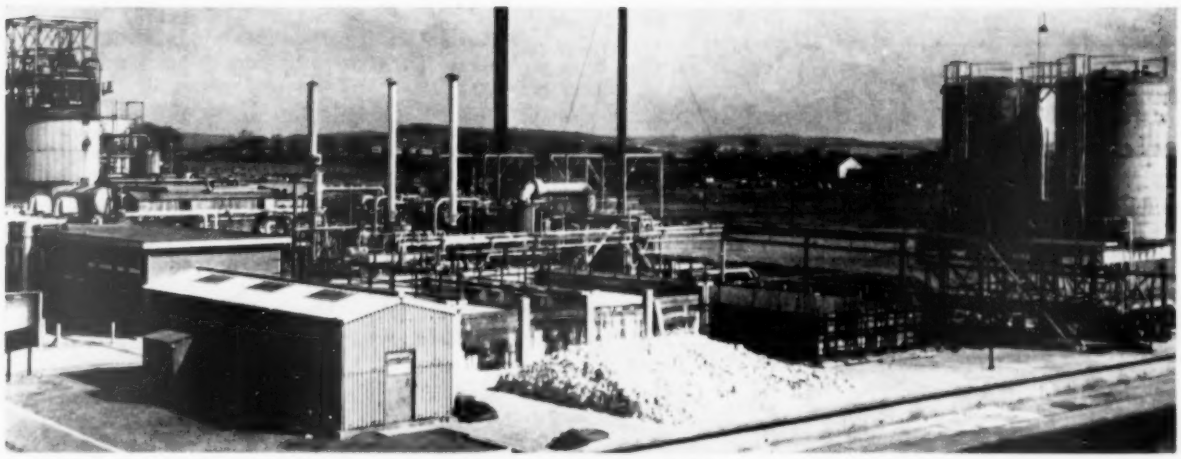
This Shell Stanlow plant has several claims to recognition. It was the first in the United Kingdom to install a fluid cat cracker, the first to recover elementary sulfur from cracked gases, the first to erect a Platforming unit, and the first in the world to construct a hydrodesulfurization plant.

Stanlow also pioneered the production of the synthetic detergent Teepol, and the manufacture of petroleum-derived solvents in substantial tonnages. The refinery proper and petrochemicals plant both adjoin the Thornton Research Center, focusing the group's research and development activities in the United Kingdom.

Stanlow growth . . . As early as 1922 Stanlow was chosen by Shell as the site for an installation initially devoted to the discharge and storage of oil cargoes from overseas. Soon a bitumen-manufacturing plant was added. It was followed by another installation for the production of special-boiling-point (S.B.P.) spirits to meet the exacting demands of home users.

In the late 1930's a new continuous blow bitumen plant came into existence. A much larger and more efficient S.B.P. spirits plant was completed in time for it to be used for the production of nitration-grade benzene and toluene in the early part of World War II.

During that emergency a plant for the manufacture of isooctane from imported raw material was brought into operation. At the same time other spe-



Sulfur conversion unit at Stanlow.

cial products were produced. Thus the Duosol series of installations began turning out high-quality aviation lube oils, which proved very helpful to the Allied air forces.

These were accompanied by another series of lube-oil plants designed to produce a wide range of special lubricants needed by British industry. Also, processes were developed for the recovery of byproducts like naphthenic acids. Moreover, a process was evolved for the production of the cleansing and wetting agent Teepol — the basis of which is wax obtained during the manufacture of aviation lube oil.

In 1945 the Stanlow refinery covered an area of approximately 800 acres and employed nearly 4,000 persons. With a crude charge of approximately 17,000 bbl. per day it was already the largest specialized refinery in Britain. This was, and is, the area now known as Stanlow North.

Petrochemical operations . . . The new Stanlow refinery (the Stanlow South group) was designed as an extension of the Northern group and integrated with the petrochemicals plant which commenced operation in 1949. Within 4 years of the start of the work, the site, from being a marshland, was transformed into a vast and up-to-date refinery for the complete processing of crude oil.

The first of the two crude-distillation units at Stanlow South went on stream in 1949 and the major construction program was completed by the end of 1952. In the meantime a thermal reformer and the second crude-distillation unit had come on stream.

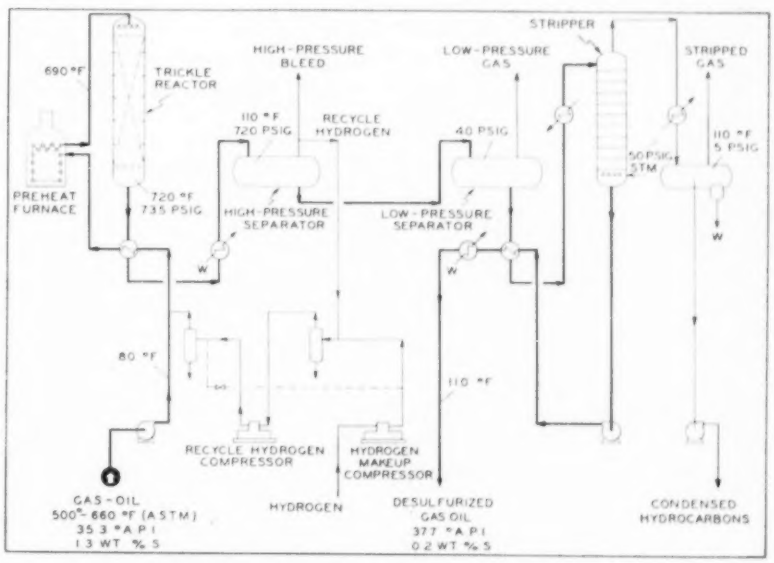
The largest unit of all, the $20,000,000 fluid catalytic cracker, and its complementary feed-preparation plant, also started operation in early 1952. The newest plant at Stanlow and the first of its kind erected in the United Kingdom is the Platformer scheduled for completion before the end of 1953. Also under construction is the world's first hydrodesulfurization unit which should be functioning next year.

The Stanlow refinery now produces literally hundreds of different petroleum products, ranging from L.P.G., motor fuel, kerosine, diesel, lubricating and fuel oils to bitumen. In addition to these, and to 10,000 tons a year of elemental sulfur recovered, several chemical solvents, synthetic detergents, and lube-oil additives are manufactured from fractions derived from Middle East crude petroleum.

Crude distillation . . . The two crude-distillation units at Stanlow have a combined capacity of about 97,500 bbl. per day. From the top of the fractionating column hydrocarbon gases are taken off; then, lower down, gasoline; later, naphtha, subsequently, gas oil, thus leaving a heavy bottoms residue.

Stanlow's fluid cat cracker's capacity is 25,000 bbl. per day (around 9,375,000 bbl. a year). It converts a heavier diesel type of oil into high-grade gasoline, and together with other units, contributes to the achievement of a high degree of flexibility in refining operations. It is fed from a feed-preparation unit, in which long residue is processed into distillates and short residue.

Not only does the Stanlow cat cracker increase the supply of gasoline; it also marks a further stage in the close integration of the adjoining chemical plant with the refinery's operations. In addition, it has led to the recovery of 10,000 long tons of elemental sulfur a year by providing the feed stock for the appropriate plant. Before long other byproducts of the unit will serve as raw material for the production of TEL by



Simplified flow sheet of Shell hydrodesulfurization process.

Shell's Stanlow Plant

Associated Ethyl Co. at its plant at Ellesmere Port, Cheshire.

At Stanlow there are two groups of lube-oil plants, each with a special job to do. One group makes high-quality aviation and automotive lubricants by extracting in the Duosol plant unwanted materials from a heavy crude oil.

Another section of the refinery then takes these base stocks and by blending them together, or by adding other substances, produces over 250 finished grades, ranging from aviation lubricants through automotive, diesel, industrial, and special-purpose oils to cutting oils, wire-drawing oils, rust-preventing fluids, and several others. Moreover, a separate installation outside Stanlow, but working in association, is engaged in manufacturing all types of greases.

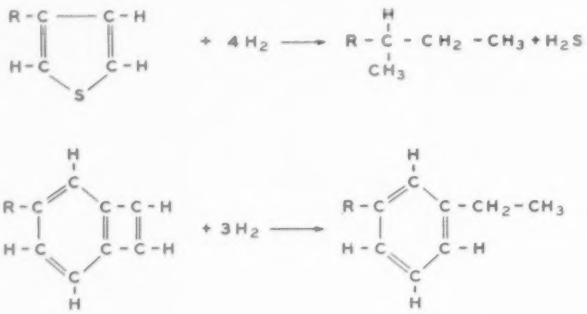
First Platformer . . . The first Platforming unit to be erected in Britain was built by Procon, Ltd., a subsidiary of Universal Oil Products Co., for Shell at Stanlow at a cost of $9,800,000. The plant, now on stream, consists of three sections—feed preparation, reaction, and stabilization. This installation produces para-xylene and toluene. These have other important uses beside the reinforcing of gasoline to raise its octane rating. Terylene (Dacron), for example, is produced from terephthalic acid obtained from para-xylene which is also the basic material used in the manufacture of plastics and kindred products.

Desulfurization Operations

Investigations of the Royal Dutch-Shell group in the B.P.M. laboratories at Amsterdam, directed toward the development of a more economical desulfurization process applicable to a wider range of feed stocks, have resulted in the perfection of the "Trickle process." Here desulfurization is brought about by passing the oil in the liquid phase together with the hydrogen downward through a bed of cobalt-molybdenum-bauxite catalyst or tungsten-nickel sulfide catalyst.

The development of the Tricke phase process has not only increased the scope of application but also reduced the hydrogen recycle rate to a fraction of that required for vapor phase operation. A 5,000-bbl. per day hydrodesulfurization unit employing this process is now under construction at the Stanlow refinery. It is reckoned that investment and operating cost for this liquid-phase unit will be 80 per cent of those needed for the vapor-phase units that Shell has in operation at the present time.

In this new process the sulfur occurring in a combined state is removed by substitution with hydrogen. The sulfur compounds in both straightrun and cracked gas-oil fractions are essentially of the thiophene and benzothiophene structure with small quantities of sulfides and mercaptans possibly being present. The principal desulfurization reactions are:



Operating conditions . . . Normal operating pressures range from 300 to 750 psia. and average reactor temperature is approximately 700° F. For deep desulfurization (80-90 per cent sulfur removal), pressures of 600 to 750 psi. are employed. Under these conditions the carbon-sulfur, carbon-oxygen, and to a lesser extent the carbon-nitrogen bonds are broken while essentially no carbon-carbon bonds are split.

The characteristics for both the feed and product oils when processing Kuwait straight run gas oil are shown in Table I.

TABLE I
Feed and Product Specifications, Hydrodesulfurization Unit

	Feed	Product*
Gravity, °A.P.I.	35.5	37.7
Aniline pt., °F	162.5	167.5
Bromine No.	1	1
Flash point, °F.	253	195
Pour point, °F.	14	
Extr. with H_2SO_4, per cent wt., per cent	28	25
Conradson carbon on 10 per cent residue, per cent wt., per cent	0.02	
A.S.T.M. distillation:		
I.b.p., °F	496	455
10 per cent	525	513
30 per cent	538	532
50 per cent	556	550
70 per cent	581	577
90 per cent	624	622
F.b.p.	666	662
Residue, vol. per cent	1.0	1.5
Loss		
Hydrogen, wt. per cent	13.26	
Carbon, wt. per cent	85.44	
Sulfur, wt. per cent	1.30	0.20
Molecular weight, (Est.)	243	241
U.O.P. K factor	11.9	12.0
Diesel index	57.7	63.1

*Properties of liquid product obtained experimentally by flashing to atmospheric pressure (i.e., without stripping out light ends).

Petrochemical Operations

The most important chapter in petroleum-chemicals development in Britain opened in 1949 when the Stanlow Chemical Solvents installation came on stream. There were three important reasons why advent of this series of integrated plants was significant. It brought an entirely new industry to Britain, and, in so doing, aided easing the country's postwar economic problems.

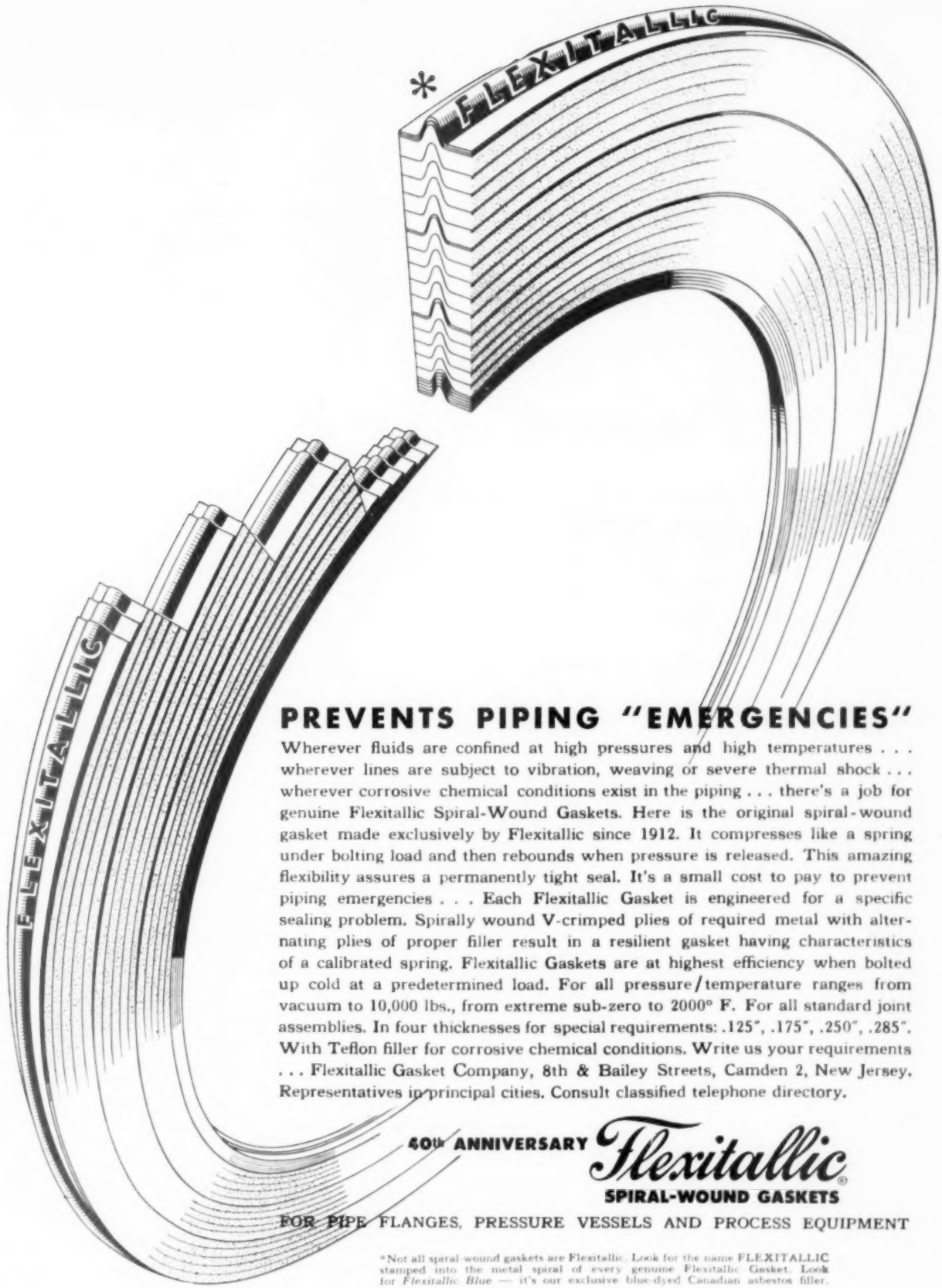
The thermal reforming and cat cracking both produce light hydrocarbons normally as gases. At this stage oil refining merges into the manufacture of chemicals. Hydrogen sulfide is one of the products of the cat cracker, an impurity which must be removed from the fractions of the gas-separation unit before they can be used in the chemical plant. From it is manufactured elemental sulfur +99.9 per cent pure at the rate of 10,000 long tons a year.

Gas-oil feed . . . The Stanlow petrochemicals plant makes use of gas oil as feed stock. This is fed into the thermal cracking unit where it is cracked at high temperatures and low pressures to procure the maximum formation of gaseous products. The cracked items are roughly separated into heavy fuel oil, which is burned and a mixture of light components.

The latter mixture is fed into a gas-separation unit and split up into five fractions: a mixture of light gases containing hydrogen, methane, ethane, and ethylene which is burned; three other fractions containing hydrocarbons with 3, 4, and 5 carbon atoms respectively, and a volatile liquid, which is blended into motor gasoline.

This fraction of hydrocarbons containing five carbon atoms is returned to the cracking furnace and is further pyrolized. The two fractions with three and four carbon atoms contain a high proportion of reactive olefins, and it is these C_3 and C_4 fractions which form the feed stocks for the manufacture of chemical solvents.

Under suitable conditions, acetone, derived from isopropyl alcohol, is converted to diacetone alcohol, which, in its turn, is transformed to methyl isobutyl ketone via mesityl oxide.



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Protective oil well at Sudr, Egypt. In background can be seen the discovery well. Operations here are carried out on joint partnership between Anglo-Egyptian Oilfields, Ltd., and Socony-Vacuum.

Oil Policy Improves in Free World Nations

. . . Investment capital being attracted by

- More favorable, liberalized tax structure
- Promise of long-term exploitation periods
- Avoidance of burdensome obligations
- Granting of large, unbroken land tracts

by C. F. Dohm

A SIGNIFICANT, but unheralded trend towards an improved oil-investment climate is becoming evident in the recent policy expressions of a growing number of Free World countries. Though this trend started more than 2 years ago and has since gained considerable momentum, it has been obscured largely by the more dramatic oil developments in Iran.

In some countries this trend has become manifest through the promulgation of comprehensive new oil laws creating the legal framework for a highly competitive private-enterprise situation, where nationals of all countries may compete on more or less equal terms, and in other countries it has become manifest only through the pronouncements of intent by responsible government officials without as yet any accompanying changes in the laws governing oil and gas operations.

In some countries this change signals a marked departure from deep-seated nationalistic traditions having their origin in early mining laws and regulations and in others it reflects the further refinement of an already favorable oil-investment climate.

Successful development . . . The emergence of this trend demonstrates a growing awareness by national leaders of many different and widely scattered nations of the interrelationship between successful evaluation and development of a nation's oil resources and the degree to which a climate conducive to private investments has been achieved. Indeed, a cataloging of the producing nations of the Free World listing the nations in the order of their producing importance would be virtually a listing of the degree to which the respective nations have induced the investment of venture capital.

Wherever this new oil policy trend has become manifest it reflects a more or less conscious effort to satisfy four conditions which are essential to the achievement and maintenance of a healthy oil-investment climate.

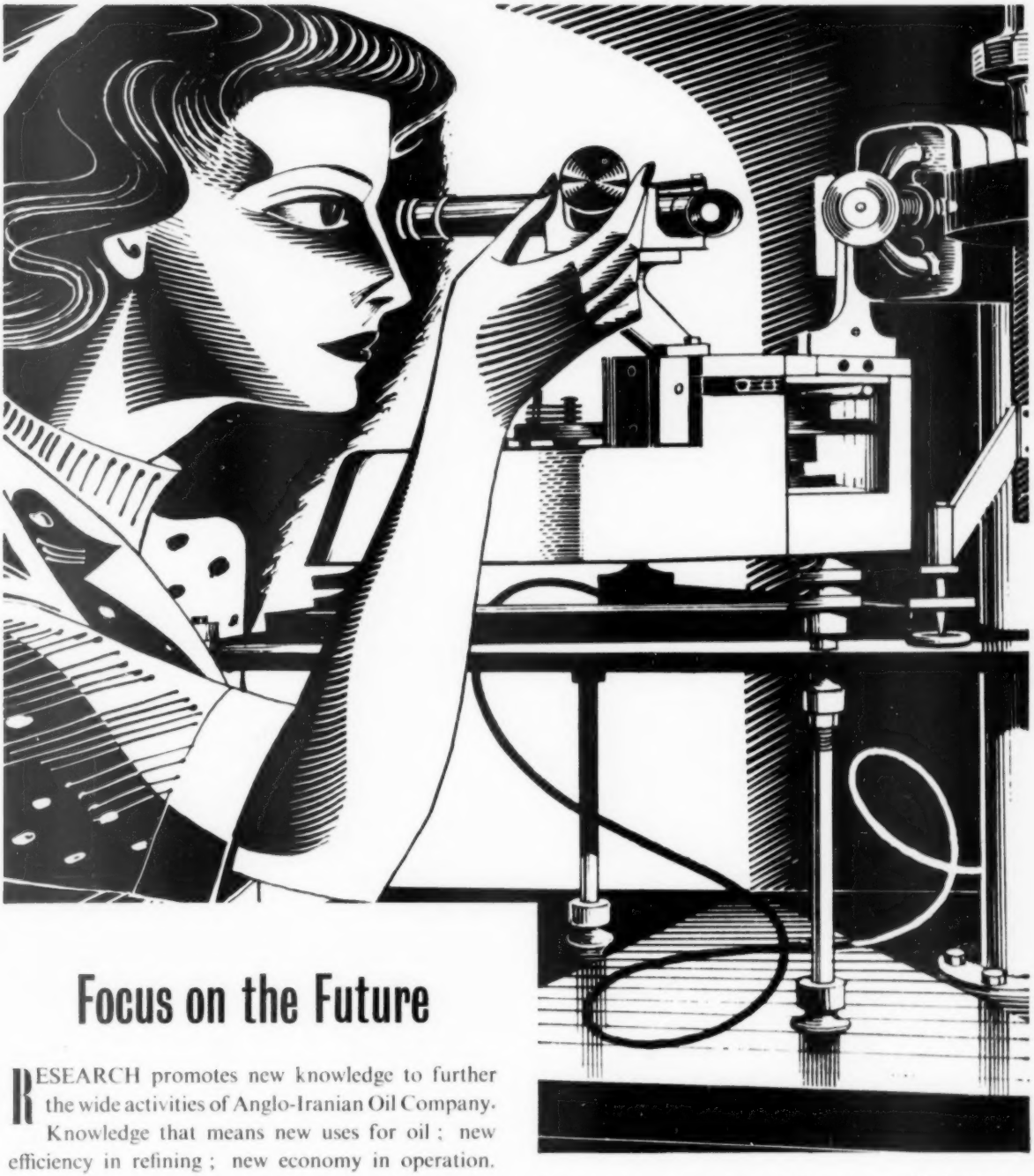
1. The most important, perhaps, of these four conditions is a tax structure which recognizes the unique character of the oil and gas producing industry and provides the incentive to invest in the highly speculative search for and development of petroleum resources. The value of a depletion allowance in achieving the desired tax structure is becoming almost universally recognized.

2. The promise of long-term exploration and exploitation periods is another condition that must be satisfied if investment capital is to be attracted to the search for petroleum. Only long-term exploration and exploitation stages enable the operator to conduct the search for petroleum in a thorough and systematic manner and to adopt conservative development and producing practices.

3. Another essential condition to the achievement of a healthy oil-investment climate is the avoidance of excessive acreage carrying charges or exploratory-work obligations. For excessive rentals or work obligations lead to the adoption of hit-or-miss exploration practices which almost inevitably spell failure in an exploration venture.

4. The fourth condition, and this applies particularly to little explored areas where the presence of commercial accumulations of petroleum have not yet been established, is the opportunity to possess relatively large, unbroken tracts of land. The modern search for oil in new unexplored areas consists of a step-by-step accumulation of geological knowledge.

Concurrently, as geological information accumulates, more and more of a basin's total area is eliminated as likely oil territory. Thus, if the investor, whose capital is financing the necessary accumulation of data does not possess a large enough area originally, he may be precluded from shifting his search for oil areally in response to the growing geologic knowledge, and thus unable to profit by his efforts. When these four basic conditions are satisfied by a country's petroleum legislation, the keystone of an investment climate that will induce a vigorous



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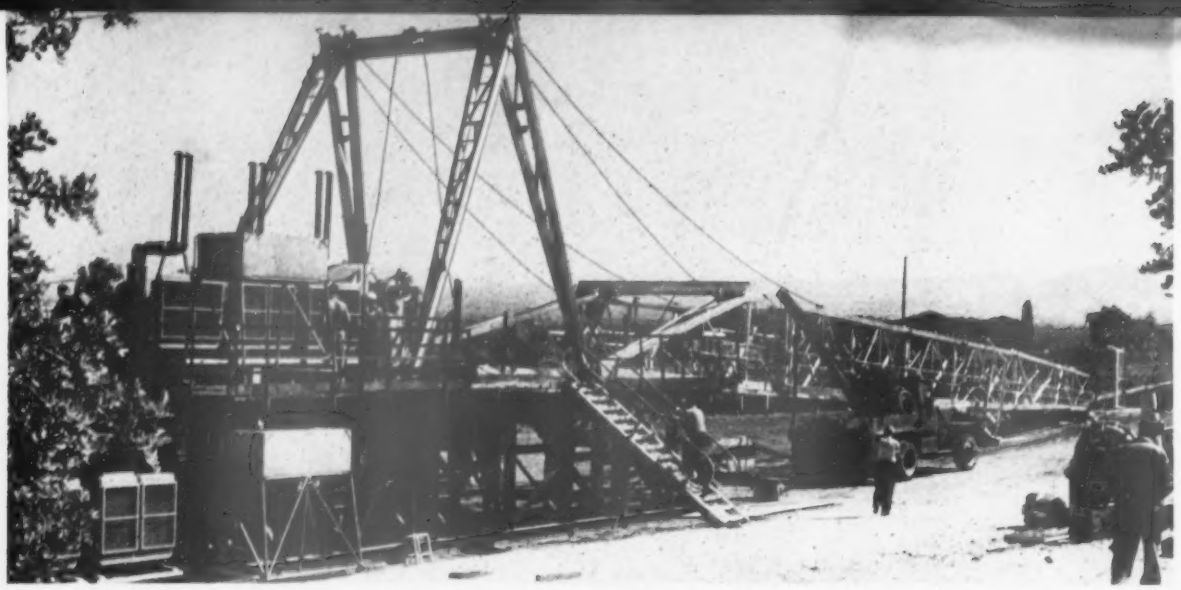


Rigging up for the wildcat test of D'Arcy Exploration Co., Ltd., near Vittoria, Sicily. (Courtesy Anglo-Iranian Oil Co.)

search for and development of its petroleum resources has been laid.

French Situation

One of the latest countries to take steps designed to create a competitive petroleum situation is France which has historically pursued a nationalistic attitude insofar as the development of its mineral resources is concerned.

In the Financial Law for 1953, passed by the French Assembly and signed by the president in early February this year, there are two articles which affect materially the French petroleum producing industry. The most significant of these is the one which establishes for the first time in the income-tax structure the principle of a percentage oil and gas depletion allowance.

Under the provisions of this article, producers of oil or gas, in calculating their annual income taxes, are permitted to deduct as an allowance for depletion an amount equal to 27½ per cent of the gross income from producing operations. As in the United States, the total amount so deductible is limited to 50 per cent of the net profit, but unlike the States, all amounts deducted for depletion must be plowed back into exploration or development within 5 years, or become taxable as normal income.

The second article affecting the petroleum industry regulates a subsidy created by an earlier law to encourage oil and gas exploration investments. Under the provisions of this article, properly qualified individuals or corporations may receive a subsidy from the government equal to 50 per cent of a contemplated exploration program investment.

But even more important than these two legislative measures, insofar as the reorientation of France's oil policy is concerned, is the less tangible but nevertheless notable change that has taken place in the administration of the laws governing petroleum operations.

While the basic mining laws of France have not discriminated against the foreign investor, it was virtually impossible, until recently, owing to discriminatory administrative practices, for an alien corporation to procure oil exploration or exploitation rights. Partly as a result of this administrative practice, France and its territories have been largely bypassed by the large international oil concerns, and the evaluation of France's oil resources has been accordingly retarded.

This economic nationalistic policy is now being abandoned, and a competitive situation in which private capital, alien or national, may participate, is being achieved.

Egypt's New Law

Even more recent than the reorientation of France's oil policy is the promulgation early this year of a new law in Egypt governing mining and petroleum operations. This new law removes the very serious restrictions against foreign investors imposed by the Corporation Law of 1947, as amended in 1949, and corrects some of the deficiencies of the 1948 Mining Law.

Under the 1947 Corporate Law, as amended in 1949, only Egyptian nationals or Egyptian companies in which nationals held a majority interest were eligible to acquire exploitation concessions. Not only did this restriction discourage new companies from entering Egypt, but even more importantly, it disqualified the two companies already engaged in oil production in the country—subsidiaries of Shell Oil Co. and Socony-Vacuum Oil Co., Inc.—from acquiring exploitation leases on properties they had explored.

The newly promulgated law, by removing this restriction, discontinues this discriminatory practice, and is a big step forward in achieving the atmosphere that will induce the foreign oil investor with his background of experience and his host of trained personnel to join hands with Egypt in the evaluation of its petroleum resources.

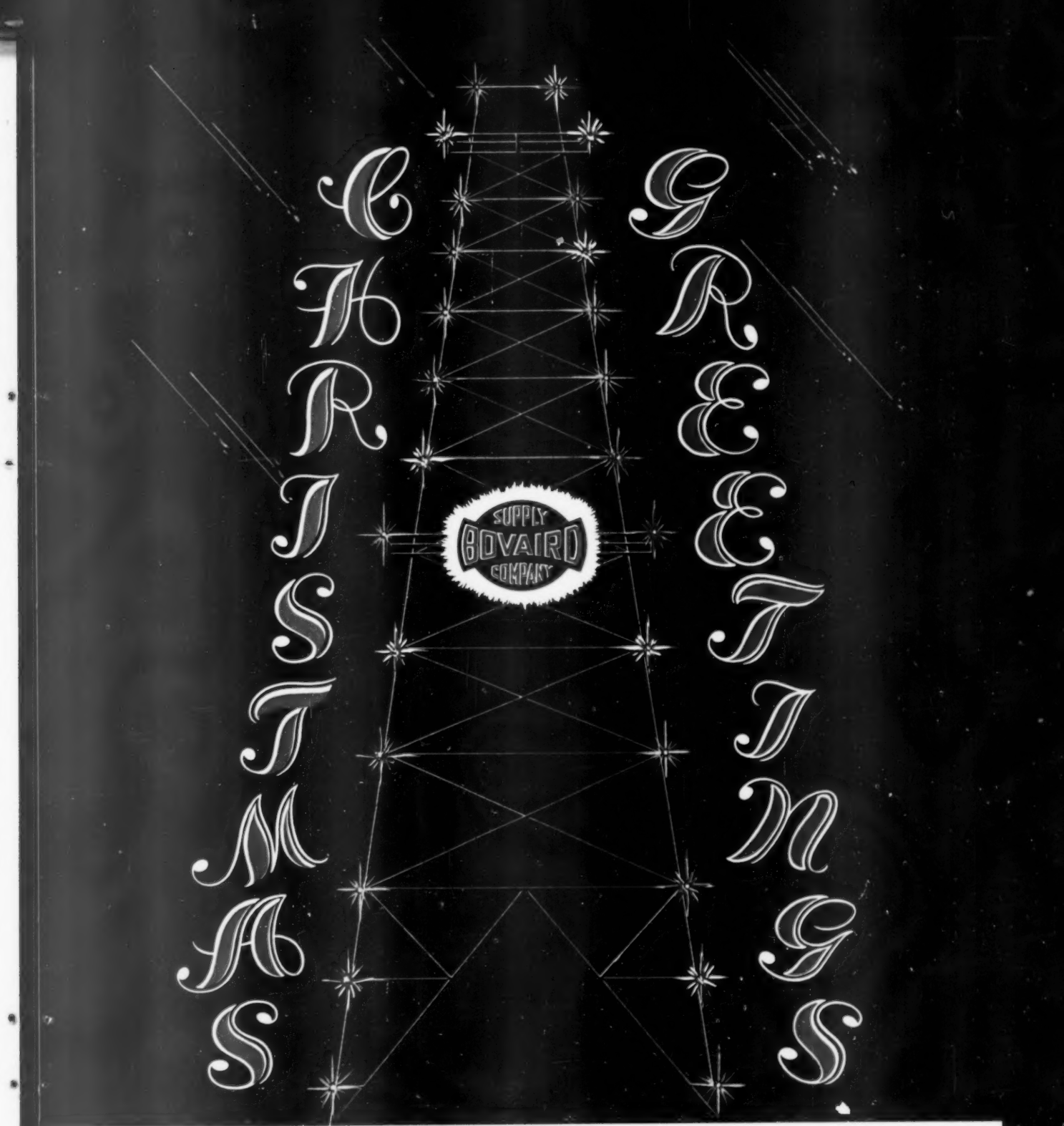
Turkey Liberalizes Laws

Slightly predating the very recent promulgation of the new mining law in Egypt and the reemergence in that country of an oil policy devised to attract foreign venture capital, encouraging announcements of a completely revised oil policy were made by officials of the Turkish Government. These announcements, made in late 1952, proclaimed the government's intention of replacing the former, highly national-

The Author

C. F. DOHM

C. F. Dohm has been engaged in foreign oil-producing activities for the past 16 years. Starting his career in the petroleum industry as a field geologist in eastern Venezuela, when much of that territory was still unexplored, he is presently vice president of Conorada Petroleum Corp. He is a member of the American Association of Petroleum Geologists, the American Institute of Mining and Metallurgical Engineers, the American Society of Photogrammetry, the Mexican Geological Society, and the Pan American Society. He is also a fellow of the American Geographical Society of New York. A graduate of the geological school of Louisiana State University, he was a member there of the Geological and Mining Society of American Universities and of Phi Kappa Phi, an honorary scholastic fraternity. As his company's activities are confined to foreign producing operations, the author spends more than half his time in travel abroad.



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82 YEARS OF PROGRESS WITH THE OIL INDUSTRY

istic policy by a free-enterprise situation.

Under former policy, adopted when the nation was undergoing that great economic and social revolution touched off by Kemal Ataturk, all oil exploration and development activities were channeled through a government oil monopoly, and while there were no specific statutory provisions excluding the participation of foreign capital in these activities, administrative practices discouraged the investment of private capital.

The new policy is to be implemented by the passage, at a very early date, of a modern, comprehensive petroleum law. This law is to enable private capital, without discrimination as to nationality, to procure long-term exploration and exploitation permits. Exploration licenses having a 5-year initial period, with yearly extensions available are contemplated, and exploitation concessions are to have a 50-year initial term.

Royalties in the neighborhood of 10 per cent are envisioned, and a 27½ per cent depletion allowance is projected. While a ceiling is contemplated on the maximum acreage any on entity may hold in each of the various petroleum districts into which the nation has been divided, the ceiling is being set realistically high and hence should not prove a serious deterrent to interested oil companies.

Israel Developments

Preceding by only a few weeks the Turkish Government's announcement in late 1952 of a new oil policy, was the promulgation of a petroleum law in nearby Israel. While, as in most other countries, this new law affirms state ownership of all hydrocarbons, it lays the foundation for a competitive oil climate, and empowers the state to grant the necessary rights of exploration and exploitation to encourage the entry of foreign oil capital. As in Turkey, a ceiling is set on the maximum acreage that a concessionaire may possess in a given petroleum district.

Exploration licenses conveying exclusive exploration rights have an initial life of 3 years but may be extended, upon satisfying certain conditions, up to 4 additional years. Exploitation leases conveying exclusive rights have an original duration of 30 years, renewable for an additional 20 years. Royalty payable to the government is 12½ per cent, but as the law establishes minimum annual payments, it is possible that this rate may be exceeded if only small volume production is achieved.

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Libyan Law

Newly created Libya, which achieved its sovereignty through United Nations action less than 2 years ago, is another of the growing number of countries in which oil policies are being crystallized that will encourage private oil exploration and development investments. It appears that Libya's oil policy will be implemented through the passage of two laws—one a Natural Resources Law which will be concerned primarily with clarifying the jurisdiction of the federal and provincial governments over subsurface mineral rights; and the other a comprehensive petroleum law, patterned to a large extent after the petroleum regulations in force in a number of United Kingdom areas.

While the final details of the projected oil law have not been formulated, and though the bill now being drafted by the executive power is subject to change by the national assembly, whose ratification is required for enactment, the basic principles as presently understood will create a competitive situation in which both national and foreign private capital will work on equal terms. Under the contemplated law three different forms of oil concessions are envisioned, the initial form being an exploration license, the intermediate form a prospecting license, and the final form a mining lease.

In order to insure active exploration by a licensee, it is contemplated that minimum exploration investment obligations on a per annum basis will be established. The government's participation in any oil found and produced will be in the nature of royalties, the percentage of which has not yet been determined. But whatever royalty is initially fixed in a concession contract will be subject to review and possible modification at a later date.

In recognition of the unexplored character of the country and the many problems attendant to exploration in desert areas, oil-prospecting licenses and leases of long initial periods are envisioned, and no ceiling is being contemplated on the maximum area that any one licensee may acquire.

Peruvian Developments

In the Western Hemisphere there have also been some noteworthy oil-policy developments in the past 2 years. The most important perhaps of these is the one that took place in Peru last year, when Peru's Congress ratified a bill creating a new, very comprehensive petroleum law. Passage of this law climaxed a frequently bitter 10-year struggle for an enlightened oil policy led by a small group of military officers and officials of the government's petroleum bureau.

While this new law accords Peruvian nationals some preferential treatment, both in regard to the acquisition of concession areas and in the payment of profit taxes, its over-all acceptability is demonstrated by the fact that in late October 1952, when foreign corporation could apply for concessions for the first time under the law, 13 different companies, 5 of them representing large American oil groups, submitted applications for concessions.

After reaffirming state ownership of petroleum deposits, the new law provides for the issuance, to properly qualified applicants, of either oil exploration, exploitation, marketing, refining, or pipe-lining concessions. The exploration concessions are of an exclusive character and convey, in addition to conventional exploration privileges, the inherent right, upon satisfying certain prescribed conditions, to an oil-exploitation concession.

The exploitation concessions convey the right to develop, transport, and mar-

ket petroleum from the corresponding concession area. Four petroleum districts or zones have been established in the country, and in order to induce a proper balance of work throughout the nation, the terms and obligations of concessions in each zone vary in attractiveness according to accessibility of the zone and its proximity to tidewater.

As a compromise to some of the more nationalistic elements that opposed passage of the new law, a ceiling is established on the maximum acreage that any concessionaire may apply for initially, the maximum in the Coastal zone being 400,000 hectares, and in the Montaña—that inhospitable, tropical-rain forest east of the Andes—1,000,000 hectares. While the initial duration of exploration concessions in the Coastal zone is only 3 years, two annual extensions may be procured.

Exploitation concessions, which are procurable either by initial application over unconcessioned territory, by conversion of exploration acreage, or by successful participation in certain government-directed auction proceedings, have an initial life of 40 years in the Coastal zone and 50 years in the Montaña. At the discretion of the president of the republic, concessionaires may procure extensions to the initial period of 20 years for concessions in the Coastal zone and 25 years for those in the Montaña.

As is the practice in most Latin-American countries, a minimum of 50 per cent of the original area must be surrendered to the nation when an exploration concession is converted to an exploitation concession. Concessionaires of exploration or exploitation concessions enjoy customs-duty exoneration on importation of material and equipment required for their operations.

No Peru royalty . . . Unlike the petroleum laws presently in force in many other countries, the new one in Peru does not require the payment of an oil royalty to the government, the nation's participation being derived solely through the levy of a tax on profits.

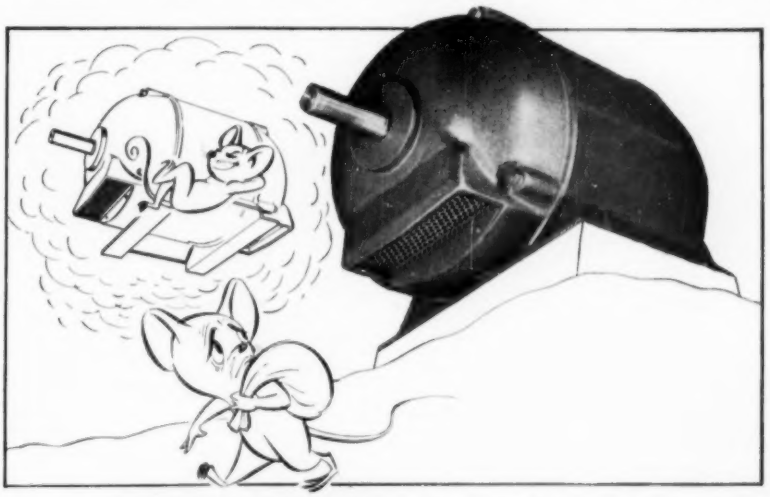
This tax amounts to 50 per cent of the net profit, but in arriving at the net there is deductible, in addition to the conventional expense and depreciation items, a percentage depletion allowance equal to 15 per cent of the gross income for foreign corporations, and 25 per cent of gross for Peruvian companies. Amounts so deducted may not exceed 50 per cent of net, and as a prepayment against the profits tax, exports of crude or products are taxed at a rate amounting to 20 per cent of the crude-oil world market value.

Colombia Makes Improvements

Although Colombia has enjoyed a competitive oil industry for many years, and is now the second most important oil producer in South America, it, too, has achieved some notable improvements in its petroleum legislation during the past 2 years. The basic law of Colombia which has governed the petroleum producing industry since 1931, originally contained some very serious deficiencies and several highly objectionable provisions.

Through a series of presidential decrees, subsequently ratified by congress, that began to be issued in early 1950, most of these deficiencies have been corrected. The first modifying decree that appeared in 1950 established for the first time in Colombia's tax structure the principle of a depletion allowance in calculating income taxes. And by permitting the surrender of exploration concessions without the former obligation of prior exploration drilling, the same decree removed one of the most objectionable provisions in the 1931 law.

Later in 1950 another presidential decree appeared which further liberal-



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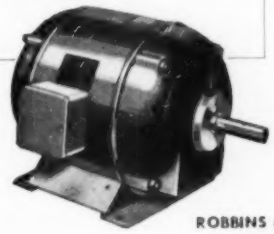

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ized the basic law by extending the former initial duration of exploration concessions and more importantly by removing the former completely unrealistically low ceiling on maximum acreage holdings. The most recent important modification in Colombia's petroleum legislation took place in May 1953, with the complete codification of former legislation.

Colombian ownership . . . As before, the nation under the new code continues to recognize private subsurface rights on all lands alienated before October 28, 1873, but proclaims state ownership of hydrocarbons on all other lands. Oil-exploration and exploitation concessions may be secured by qualified applicants on nationally owned lands over which the state possesses hydrocarbon rights, but to discourage speculators, applicants must demonstate having done prior exploratory work in the area solicited.

The initial period of exploration concessions is 5 years, with two possible renewals of 3 years each. But if the concessionaire has not encountered petroleum in commercial quantities by the end of the eighth year, the government may issue three additional annual extensions. Exploration concessions convey the inherent right to an exploitation concession, but upon converting to exploitation status, a minimum of 50 per cent of the original exploration area must be surrendered to the nation.

Exploitation concessions have an initial life of 30 years, renewable at the option of the concessionaire for an additional 10 years, but such renewal is conditional upon acceptance of the exploitation concession terms in force at the time of renewal. Both exploration and exploitation concessions located east of the Andes have longer initial and renewal periods than those located elsewhere.

The royalty payable on production from national concessions follows a formula unique in Latin America in that it is graduated in accordance with distance of the field from tidewater. The graduated scale ranges from 13 per cent on production from areas within 100 km. of tidewater to 0.5 per cent on lands situated 900 km. or more from tidewater. On production derived from lands whose subsurface rights are privately owned, the government levies an excise tax which, like the royalty formula, is graduated in accordance with distance of production from tidewater.

Venezuela Historically Sound

While it is generally acknowledged that the important production achieved by Venezuela, now the second largest producer in the world, is largely a reflection of that country's historically sound oil policy, the fact remains that no new areas have been made available for exploration and development by Venezuela since 1945.

The short-range effect of this static land policy has been a very appreciable decline in exploration activities with the result that there is now a serious imbalance between current production rates and current efforts to find more reserves; and capital which the international oil companies would probably have invested in exploration in that country had land for exploration been available has been diverted elsewhere and thus lost irretrievably to Venezuela.

The serious implications of a static land policy have been recognized by many of Venezuela's leaders for a long time, and it is being reported now that a new policy may be adopted in the near future. According to these reports, a committee of top government officials have been selected to conduct a study of Venezuela's oil policy, and if the committee reports favorably, a new, dynamic land policy may be adopted.

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Wildcatting Up . . . Completions, Production Down

. . . that's the story today in Venezuela where operators are finishing a year of fence mending

BY September's end, 1953 was shaping up as a year of fence mending for the companies operating in Venezuela. The hectic production activity of the years since the Iranian shutdown was over, and operators were free to take care of other aspects of their business. Decreased demand for heavy oils was causing a decline in western Venezuela activity, and a corresponding increase in eastern Venezuela.

Production, which increased 13.4 per cent in 1950 and another 13.8 per cent in 1951, gained only 5.5 per cent in 1952, and this year is showing a 4 per cent decrease. Even so, it continues some 30 per cent above 1948-1949 levels.

Completions were lagging 27 per cent behind last year's—only 80 per month, as against 110. Wildcat completions were up 4 per cent to account for 12.5 per cent of the total, and the wildcat success ratio was 11 per cent higher than in 1952. However, over-all dry holes were up almost 5 per cent.

Greater depths . . . Since over-all rig time was at the same level as in 1952, the explanation of the decrease in total completions seemed to lie in the increased proportion of wildcatting and in greater average drilling depths in both wildcat and development wells.

Party-months of surface exploration continued at the same high rate as in 1952. As a consequence of the reduced demand for heavy oils, there was a decline of 5.5 per cent in surface-exploration activity in western Venezuela and a corresponding increase in eastern Venezuela, which in general produces higher-gravity oil.

Rigs active in eastern Venezuela went up by exactly the same proportion as surface exploration, 5.5 per cent, and declined a like amount in western Venezuela.

In 1953 for the first time, eastern Venezuela was supplying more than 30 per cent of the total national production.

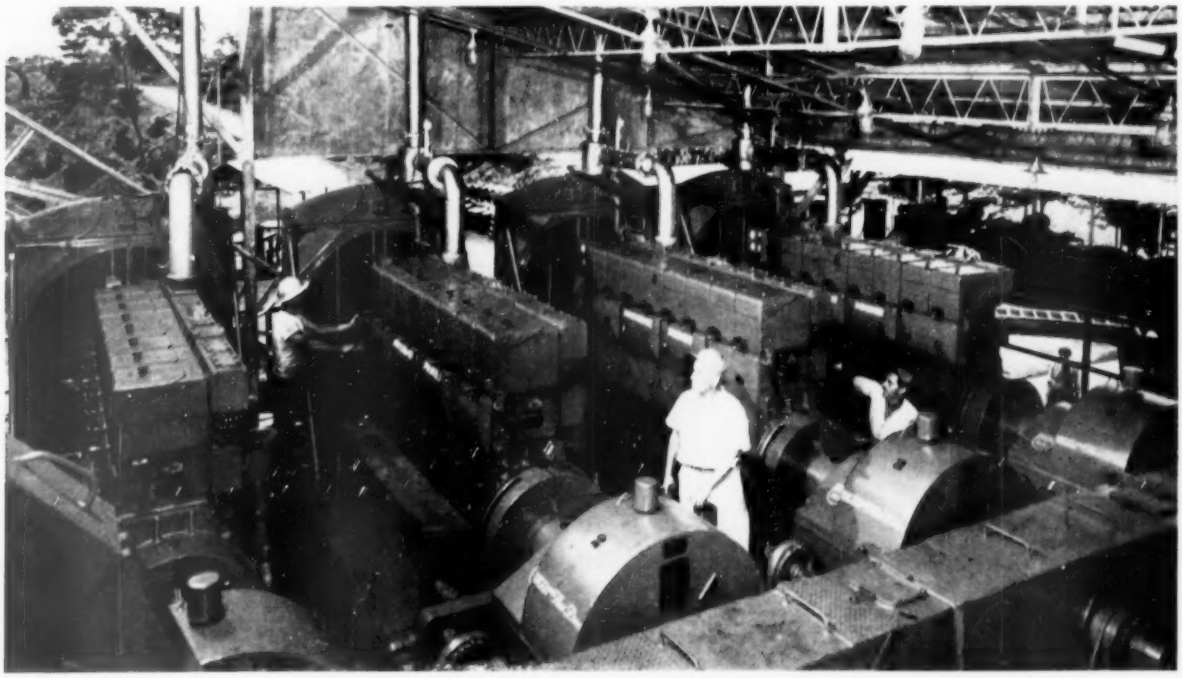
Oil-Production Analysis

What has been happening to production in recent years is shown by Table 1. Record gains were made beginning in 1950, the year the Iranian shutdown created a 700,000-bbl. per day deficit in world supply. The rate of increase began to slow down in 1952 and a decrease of 4 per cent is indicated for this year, but production will still be some 30 per cent higher than in 1948-1949.

Table 2 gives a breakdown of east-west production this year and compares daily averages by months for 1952 and 1953.

TABLE 1—VENEZUELAN PRODUCTION BY YEARS

	Total	Daily average	Per cent change	1948 as 100
1948	489,998,455	1,339,000		100.0
1949	482,299,104	1,321,000	—1.5	98.5
1950	546,712,969	1,498,000	13.4	111.5
1951	622,188,784	1,705,000	13.8	127.0
1952	660,488,578	1,804,000	5.5	135.0
1953 (estimated)	634,000,000	1,732,000	—4.0	129.5



Diesel engines on a rig drilling a deep Shell test in western Venezuela.

TABLE 2—VENEZUELAN DAILY OIL PRODUCTION BY MONTHS

	1953			
	Eastern	Western	Total	1952 total
January	545,641	1,247,383	1,792,844	1,811,680
February	550,109	1,169,021	1,719,130	1,828,420
March	547,769	1,171,791	1,719,560	1,820,154
April	541,834	1,202,743	1,744,577	1,830,811
May	549,452	1,190,679	1,740,131	1,844,941
June	567,749	1,182,230	1,749,979	1,825,444
July	558,867	1,173,252	1,732,119	1,804,023
August	556,656	1,126,284	1,682,940	1,725,524
September	567,310	1,142,940	1,710,250	1,718,537
Average	553,931	1,179,591	1,732,392	1,801,060

Production by months, shown in Table 3, has been consistently less this year. The difference has been as great as 5,000,000 bbl. (February) and as little as 200,000 bbl. (September).

TABLE 3—VENEZUELAN OIL PRODUCTION BY MONTHS, 1952-53

	1952	1953
January	56,162,079	55,578,173
February	53,024,204	48,135,641
March	56,424,775	53,306,372
April	54,924,357	52,366,336
May	57,193,161	53,944,061
June	54,763,352	52,499,387
July	55,924,738	53,695,756
August	53,491,247	52,171,149
September	51,556,133	51,307,507

According to figures of the Ministry of Mines and Hydrocarbons, additions to reserves have over the last 5 years averaged about 990,000,000 bbl. per year. This year's increased wildcat activity, and increased wildcat success, should result in a gain of 1,000,000,000 bbl.

Rigs Running and Completions

Last year, 1,322 wells were completed in Venezuela in a total of 112 rig-years, or 1,342 rig-months. In other words, 1952 completions were made at the rate of 110 per month, or one rig-month per well.

Total rig-months for the first 9 months of 1953 were almost exactly the same in 1953 as in 1952. On a rig-time basis, therefore, the number of completions should be about the same this year as last. However, the comparison in Table 4 shows that this is not the case, and 30 fewer completions per month are being made in 1953.

TABLE 4—WELL COMPLETIONS, 1952-53

	Wells
1952 (12 months)	1,322
Monthly rate	110
1953 (9 months)	720
Monthly rate	80

With no drop in over-all rig-months, the explanation of the falling off in the number of completions this year must be due to other causes. Table 5 suggests two partial answers: increased wildcatting, and deeper drilling generally.

TABLE 5—COMPARISON OF DRILLING DEPTHS AND WILDCAT EFFORT

Year	Total wells	Footage	Feet per hole	No. of wildcats	Per cent wildcats
1949	682	3,581,883	5,252	50	7.3
1950	663	3,336,844	5,033	43	6.5
1951	1,205	5,424,253	4,501	93	7.7
1952	1,322	6,624,278	5,011	101	7.7
1953 (9 months)	720			90	12.5

Total completions rose 82 per cent in 1951 as compared with 1950, and 1952 completions were just 100 per cent over 1950's. Significantly, these were the years when the Abadan shutdown was most deeply felt. Operators in Venezuela, as elsewhere, used up proved locations in their shallowest-drilling fields in an effort to get as much oil as possible to market. Note the average 4,500-ft. depths in 1951 as compared with 5,252 ft. in the more normal times of 1949.

Wildcats show gain . . . While completions and production went soaring to record heights, the proportion of wildcat completions stayed at about the same average level of 7.5 per cent from 1949 to 1952. This year, for the first time in 5 years, wildcatting is showing an appreciable gain, with 90 wildcats completed in the first 9 months for 12 per cent of total wells.

What this means is that operators are going all out to discover new reserves to replace those drawn upon in the recent years of emergency. And the increase in wildcatting automatically spells slower rig turnover, as new areas and new problems are encountered, leading to increased drilling, testing, and completion time. Hence this year's slowdown in total completions.

While wildcat completions have increased by over 4 per cent, wildcat rig time has gone up by 7 per cent. As Table 6 shows, rig-months on wildcat drilling amounted to 317 in the first 9 months of 1953, as compared with 252 in the same period of 1952.

Longer to drill . . . Since wildcat completions are not keeping pace with the increase in wildcat rig time, wildcat completions are taking longer this year than they did in 1952. This is probably due to an increase in average wildcat depths. Figures are not available to support this assumption, but wildcat depths can be expected to increase in any area from year to year, as operators will naturally investigate shallower-drilling areas first, other considerations being equal. Table 7 shows record wildcat depths which are probably indicative of the trend in Venezuela.

TABLE 7—RECORD WILDCAT DEPTHS, BY YEARS

Year	Deepest wildcat	Total depth
1947	VL-1	12,106
1948	14G-1	11,766
1949	CT-1	15,637
1950	Alturitas-1	17,039
1951	Guasare-1	14,460
1952	LS-1387	17,537

Drilling is in general getting deeper in Venezuela. To October 1, one operator had completed 11 development wells and 3 wildcats to depths below 10,000 ft. Another had drilled one-quarter of

TABLE 6—ACTIVE DRILLING RIGS BY MONTHS

	Wildcat		Development		Total	
	1952	1953	1952	1953	1952	1953
January	24	38	84	88	108	116
February	25	32	85	87	110	119
March	26	32	85	82	111	114
April	31	36	80	75	111	111
May	26	53	83	69	109	112
June	32	36	81	71	113	107
July	34	36	82	70	116	106
August	27	32	87	73	114	105
September	27	32	82	78	109	110
Total	252	317	749	693	1,001	1,000
Average	28	35	83	77	111	111

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its wildcats (7 out of 26) and almost one-quarter of its development wells (47 out of 187) to below 10,000 ft.

A side effect of the decrease in demand for heavy oil is illustrated in Table 8, showing how rigs were divided between eastern and western Venezuela in 1952-1953. Rigs active in western Venezuela, which produces mainly heavy oil, declined from 44.5 per cent of the total in 1952 to 39 per cent in 1953, as operators turned to eastern Venezuela for lighter-gravity crudes.

TABLE 8—RIG-MONTHS, BY AREAS

	1952		1953	
	Mo.	%	Mo.	%
Eastern Venezuela	556	55.5	610	61.0
Western Venezuela	445	44.5	390	39.0
		100.0		100.0

The net result of drilling activity is shown in Table 9, Completions, 1952-1953. Total completions this year are down by 30 per month, and oil wells completed are down by 5.8 per cent. Dry holes are up by 4.7 per cent, and gassers by 1.1 per cent. (Since there is little market for gas in Venezuela, few wells are drilled intentionally to find gas production.)

TABLE 9—NUMBER AND TYPES OF WELL COMPLETIONS, 1952-1953

	Oil	Gas	Abd.	Total	Completions per month
1952 (12 months):					
Development*	1,144	6	64	1,214	101
Wildcat	44	7	57	108	9
Total	1,188	13	121	1,322	110
Percentage	89.8	1.0	9.2	100	
1953 (9 months):					
Development*	562	12	56	630	70
Wildcat	43	3	44	90	10
Total	605	15	100	720	80
Percentage	84.1	2.1	13.9	100	

*Includes outposts.

Surface-Exploration Analysis

Surface-exploration activity, being relatively insensitive to the changing needs of the market, is a good index to the long-range health of the industry in any area. This type of exploration is being carried out in Venezuela in 1953 at just about the 1952 rate, which was the best since 1949. The all-time high came in 1948, as Table 10 shows.

TABLE 10—FIELD-PARTY MONTHS, BY YEARS

1948	659
1949	625
1950	408
1951	408
1952	492
1953 (estimated)	594

Surface-exploration effort, in terms of both time and cost, was divided among the types of party as shown in Table 11.

TABLE 11—FIGURES AND COST OF VENEZUELAN SURFACE-EXPLORATION EFFORT, 1952-1953

	Surface geology ($5)*	Seismic ($60)*	Gravity ($20)*	Structure drill (50)*	Total
1953 (9 months):					
9-month total	173	158	28	13	372
Average per month	19.2	17.5	3.1	1.4	41.3
Per cent total time	46.5	42.5	7.5	3.5	100.0
Cost ($1,000)	$865	$9,480	$560	$650	$11,555
Per cent total cost	7.5	82.1	4.8	5.6	100.0
1952 (12 months):					
12-month total	224	205	38	25	492
Average per month	18.6	17.1	3.2	2.0	41.0
Per cent total time	45.0	42.0	8.0	5.0	100.0
Cost ($1,000)	$1,120	$12,300	$760	$1,250	$15,430
Per cent total cost	9.0	74.0	6.0	11.0	100.0

*Cost in thousands of dollars per month.

As usual, the highest percentage of time was run up by surface geological parties, but the much more costly seismograph accounted for the lion's share of the expense, probably a truer indication of relative importance to the operator.

The 5.5 per cent decline in rig time in western Venezuela, already noted, was almost exactly matched by a 5.6 per cent decline in surface-exploration activity there.

This is shown by Table 12, which also shows an interesting anomaly. In eastern Venezuela, the producing states of Anzoategui, Monagas, and Guarico absorbed by far the greater part of surface-exploration time. In western Venezuela, activity in the major producing State of Zulia was surpassed by activity in the nonproducing area of Apure-Barinas.

The difference is probably considerably greater than shown by the table, as only party-months worked in the states of Apure, Barinas, and Portuguesa were counted as "Apure-Barinas," whereas much of the work performed in other areas, such as the mountain states of Tachira, Merida, and Trujillo, was undoubtedly performed in connection with studies of accumulation in the Apure-Barinas basin.

These figures point up the intensity of interest in the Apure-Barinas basin, about which just enough is known to suggest that it is the coming third great producing basin of Venezuela. This year for the first time, official test data were publicly released on two of the several wells so far drilled there.

The figure for Apure-Barinas activity in 1953 will undoubtedly rise

TABLE 12—DISTRIBUTION OF PARTY-MONTHS, BY AREAS

	1953 months	Per cent of country	Per cent in 1952
Eastern Venezuela:			
Anzoategui	62.0	16.6	13.5
Monagas	54.5	9.5	7.0
Guarico	35.5	14.6	11.0
Other areas	7.0	1.9	1.5
Subtotal	159.0	42.6	37.0
Western Venezuela:			
Apure-Barinas	65.5	17.6	20.0
Zulia	41.5	11.2	11.0
Falcon	30.0	8.1	15.0
Other areas	76.0	20.5	17.0
Subtotal	213.0	57.4	63.0
Total	372.0	100.0	100.0

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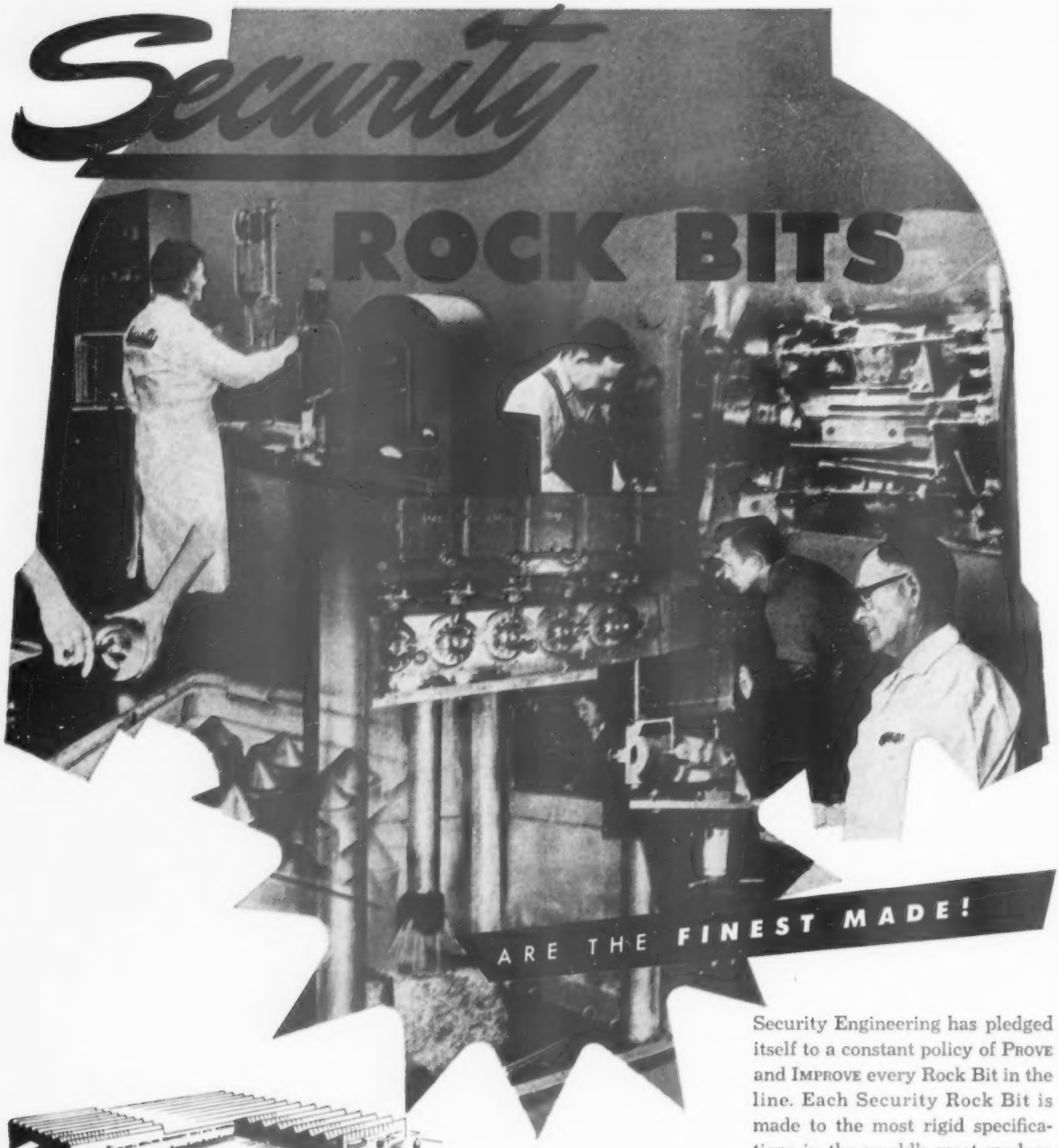

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sharply at the end of the year, with the advent of the dry season. Barinas is flat and heavily cut up by rivers, making it an extremely difficult area to work except by boat in the wet season.

Drilling and Exploration in Eastern Venezuela

Eastern Venezuela oil fields began contributing to the total output in 1917, when the New York & Bermudez Co. started shipping out heavy oil and asphalt from the vicinity of the Guanoco asphalt lake. This operation was abandoned as uneconomic at about the time of the world-wide depression of the early thirties, and no new discovery of importance was made until Standard Oil Co. of Venezuela (now Creole Petroleum Corp.) made the rich discovery at Quiriquire in 1928. This is still Creole's biggest field in eastern Venezuela, averaging about 70,000 bbl. per day.

The next major find was not made until 1933, when Standard found oil at Pedernales on the Gulf of Paria. Three years later, Mene Grande Oil Co., a Gulf subsidiary, entered the picture with the discovery of Santa Ana. Meneg went on to become the major operator in eastern Venezuela, currently with some 280,000 bbl. per day.

From 1936 to the present, hardly a year has passed (except 1943 and 1944) without the addition of several major fields to the list—Leona, San Joaquin, Jusepin, Santa Rosa, Guara, Nipa, Chimire, Soto, and Mata, to name a few.

Of the 11 operators in Venezuela, 10 have acreage in eastern Venezuela. Talon Petroleum, successor to British Controlled Oilfields, is the sole exception. Of these 10, all but Richmond have acreage in the Greater Oficina or Greater Anaco areas of Anzoategui State, and have been active there this year.

Current production and land holdings of the several companies in eastern Venezuela are illustrated in Table 13.

TABLE 13—EASTERN VENEZUELA ACREAGE AND PRODUCTION, BY OPERATORS

	Thousand acres	Daily prod.
Mene Grande	2,222	285,000
Creole	2,220	125,000
Socony	500	70,000
Texas	1,000	36,000
Atlantic	750	20,000
Sinclair	500	19,000
Phillips	225	10,000
Pantepec	60	9,000
Shell	750	
Richmond	20	

The highly faulted Greater Oficina area is the richest in oil in eastern Venezuela. About 150 fields have been found here since the discovery of the original Oficina field in 1937. In the first 9 months of 1953, 13 new fields and 11 new pools were added to the list.

One of the scenes of greatest activity in the Oficina area was the Mata trend, northeast from Central Oficina. Producers have now been completed in fields running along a 15-mile east-west stretch. Discovered by The Texas Co. in 1952, the area has now been tapped by several other operators, notably Mene Grande and Socony.

A conspicuous 1953 success in the middle of the Mata area was Mene Grande's Nigua-1, drilled on acreage in which American Maracaibo has a 20 per cent override. Nigua-1, completed dually for about 1,200 bbl. per day, is said to have opened up a potential Class A field, with reserves of 50,000,000 bbl. plus. Meneg's subsequent Zorro-1, also in the Mata area, was reported to be as good or better, with some 20 productive prospects logged.

The activity in Mata is one of the reasons why average drilling depths have increased in Venezuela this year. Average depth here is about 12,000 ft., and drilling time runs from 40 to 60 days.

Another play involving several companies has been taking place east from Oficina proper, in the Adjuntas concessions, where three new-field wildcats resulted in two new fields in 1953. Venezuelan Atlantic scored with Junta-2, and Mene Grande with Adobe-1, both drilled to about 8,000 ft.

Pancoastal made its first bid for independent production in Venezuela with wildcat PCXP-3, also in this area but closer to Leona field. This hole was abandoned at 8,100 ft. after lengthy testing, but another location on the same seismograph feature is planned.

The Soto-Boca-Mapiri complex north of Oficina proper continued to grow, with Mene Grande's Suelo-1 and Siglo-1 completed successfully as new-field and new-pool finds, respectively. Socony was also successful here, opening up a field with La Ceibita-1.

Outside the Oficina area, new finds were not numerous though The Texas Co. located a new pool with Rincon Largo-7 in the Greater Anaco area.

Northwestern Anzoategui, almost virgin territory except for two deep dry holes drilled by Shell a few years back, may be ready for a big play. Mene Grande has been drilling a very significant test, Casca-1, 15 miles southwest from Aragua de Barcelona. Nearing 11,000 ft., there were rumors that this wildcat might make a producer. Several other operators with untouched acreage in this vicinity were watching Casca-1 with deep interest.

Shell was about to go back into this general area for a series of six wildcats, one of them scheduled for 9,000 ft., the others shallower.

Farther east, in the Gulf of Paria area, three companies sought production in 10,000-ft.-plus holes west from Creole's Pedernales field. Richmond's Reco 3J-1 was dry, as were Creole's Joyo-1 and Shell's Hervidero-1, but all three were understood to be planning further tests. Creole's PCPX-3 went to over 12,000 ft., but mechanical trouble made it impossible to test the lower section.

Also in Monagas, Creole made a small producer of Uracoa-1, but this was a small producer of heavy-gravity oil, probably more in the nature of an evaluation hole, considering the current lack of demand for this type of crude.

In Guarico, Texas-Mercedes made several new-field and new-pool discoveries of lesser importance in the Mercedes area, but decreased rigs on wildcats here from seven to one as the year progressed. Venezuelan Atlantic discovered a new field with Rosita-2, but it proved disappointing on followup. Varco's Retumbo-2 was successful, but this was down in the southeast corner of the state, several miles from pipe line, and Varco has not followed it up.

The most noteworthy activity in Guarico took place in Venezuelan Atlantic's Saban field, where a succession of new-pool finds, though each of limited extent, brought production up from 4,000 bbl. a day in January to 8,000 bbl. by October.

Drilling and Exploration in Western Venezuela

In spite of the rapid addition of fields in eastern Venezuela, western Venezuela, with its 24-year head start, has continued to be the dominant factor for the country of 6,834,237,729 bbl. at the end of 1952, 76.5 per cent (5,227,850,122 bbl.) was contributed by western Venezuela fields—and 59.97 per cent (4,098,366,815 bbl.) of this was contributed by the Bolivar coastal fields of Lake Maracaibo's eastern shore, alone.

And, as already noted, western Venezuela has been responsible for more than 70 per cent of the production in any given year, until 1953.

Old as it is, western Venezuela is far from drilled up and it continues to be full of surprises. In 1945, Shell drilled in a modest Eocene field in the western Lake area and tapped pro-

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lific Cretaceous limestones. The best well flowed 30,000 bbl. per day. That discovery started a hunt for deeper production which is still eagerly being carried on.

Last year, Creole discovered the Motatan field in relatively virgin country southeast of the Bolivar coastal fields, where reportedly (data have been "tight") the gravity of the oil is in the middle thirties—commonplace for eastern Venezuela, but almost unheard of on the eastern side of Lake Maracaibo.

And besides such rare surprises as these, an ordinary outpost in the amazing Bolivar coastal fields will sometimes augment reserves by more than a whole new field discovered in eastern Venezuela.

The acreage and production situation in western Venezuela is shown in Table 14.

In 1953, The Texas Co. found a new field in rank wildcat Tiguaje-1 in Falcon State, but outposts to the original small producer were not immediately successful. Another Texas Co. activity of interest was its revival of operations in the old Mamon (or Uramaco) field, also in Falcon, which has been dead for 20 years. The Texas Co. put two of the original holes back on flow, and drilled three other producers there.

TABLE 14—WESTERN VENEZUELA ACREAGE AND PRODUCTION, BY OPERATORS

	Thousand acres	Daily prod.
Creole	1,250	610,000
Shell	2,350	550,000
Meneg	240	50,000
Richmond	500	20,000
Texas Co.	150	7,000
Talon Pet.	5	1,000

Creole found a new pool in high-gravity Cumarebo field of Falcon, with CU-147. Discovered in 1931, Cumarebo makes about 6,500 bbl. per day. Creole also discovered a second field at Motatan with Motatan-3, in the southeast Lake Maracaibo area.

Shell's Bachaquero LB-1177 found a new pool, and its Boscan-5 reportedly found an extension to Richmond's Boscan field, which produces a very heavy oil of about 10° A.P.I.

Other interesting developments in western Venezuela were unsuccessful, or incomplete in the period under review. Shell's North Pueblo Viejo LS-1387, at 17,537 ft., the deepest hole ever drilled outside the United States, was abandoned in 1953 after 2 years of drilling and six months of testing. Creole's Alturitas-2, runnerup for "deepest" title at 17,237 ft., seemed likely to be testing until the end of the year, and information on the results of the program was not available.

Besides the record hole LS-1387, Shell has done considerable deep drilling in western Venezuela this year, completing 11 development wells and 3 wildcats to depths below 11,000 ft., in search of Cretaceous production. None have given very striking results.

Shell is also leading in an experiment of considerable interest to other operators, in deepening unsatisfactory Cretaceous limestone producers into the basement. Two selected wells in La Paz field were deepened 1,000 ft. or more into basement, and one of them was reported to have improved from a few hundred to over 3,000 bbl. per day.

Apparently the basement, like the limestone, holds oil in fractures. The La Paz experiment is currently being tried on two wells in Mara field. The Texas Co. is reported to be planning to follow suit on one of its Mara wells. If successful, Creole and Mene Grande will probably join in, and there may be a basement play to rival the Cretaceous limestone play which has been going on since 1945.

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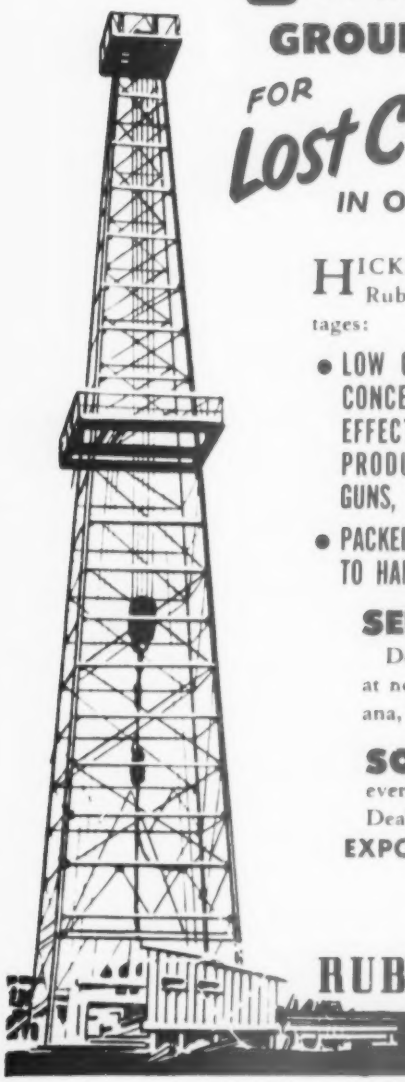

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ing tests in widely scattered areas in several states. El Mojan DMM-2, north of Maracaibo, was testing near 11,000 ft. If successful, this would extend the area of Cretaceous limestone production by several miles in a northwest direction from Mara field.

Orden-5, scheduled for 7,500 ft., was a deeper-pool wildcat in the long-dormant Venezuelan portion of Rio de Oro field. Another Shell wildcat, Friata-1, drilled to 10,500 ft., lost the bottom 1,500 ft., and was sidetracking at the end of September. This is about 40 miles southeast of Tarra field, in virgin territory.

Burgua BU-3, one of a series of tests of a large block of acreage in Tachira due south of Lake Maracaibo and extending into Barinas, was drilling at below 8,000 ft.

The Big Question Mark

The hottest drilling news of the year came from Apure-Barinas, which more and more is beginning to shape up as the future third great petroliferous basin of Venezuela.

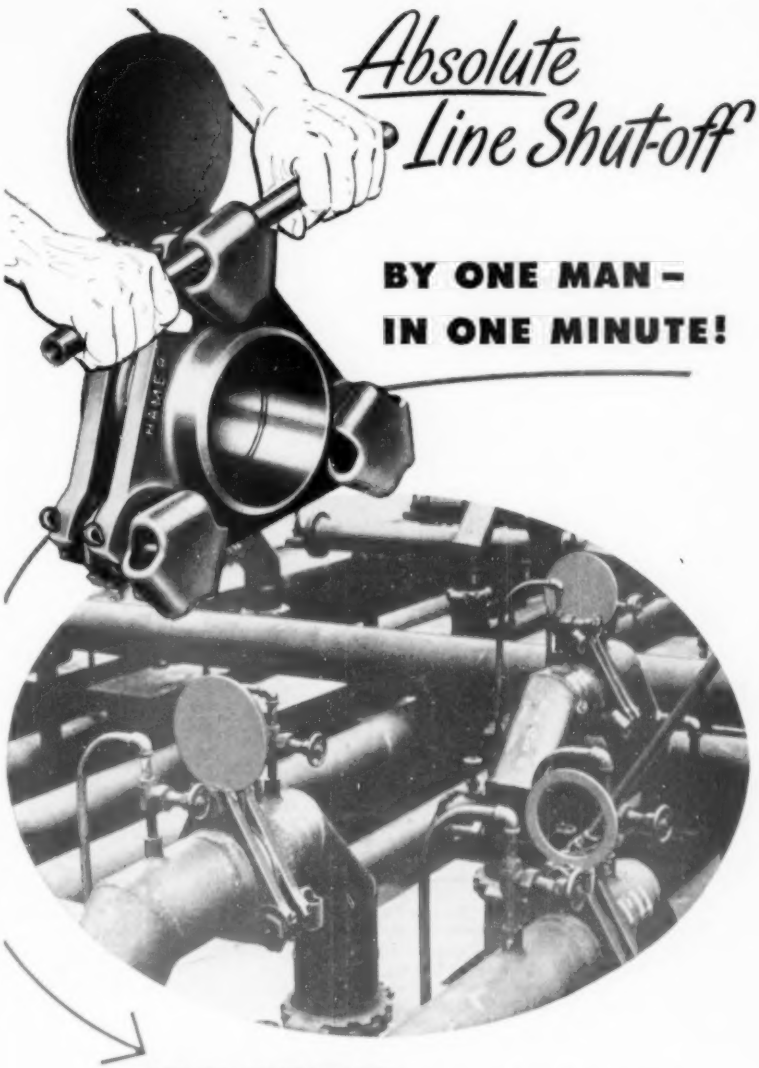
Socony-Vacuum drilled six holes in Barinas, the last one in 1949, and has succeeded in keeping the results confidential to this day. Rumor has rated these Silvestre wells at from a few hundred to several thousand barrels per day.

It has been no secret that Socony had a survey made for a pipe-line route from Barinas to Puerto Cabello, a distance of about 225 miles, badly cut up by rivers, nor that the company has bought a tract of land at Puerto Cabello as a refinery and terminal site.

This year, Sinclair has completed two wildcats in the neighborhood of the Silvestre wells. The Sinclair organization in Venezuela has followed the Socony policy of secrecy, but in reports to shareholders the directors have made public the following concrete data:

Well—	Total depth	Sand depth	Bbl./day gage	Gravity
Sinco-1	9,471	8,560	400	25.1-27.9
		8,986	600	
		9,140	312	
Sinco-2	9,472		1,607	25 & 28
		"2 zones"		

While Sinclair and Socony hold large tracts of acreage in Barinas (Sinclair has something on the order of 500,000 acres, Socony even more), it is one of the few promising areas of Venezuela which is not held solid. If and when bids for acreage here are ever solicited, there will be some spirited competition for concessions in Barinas.



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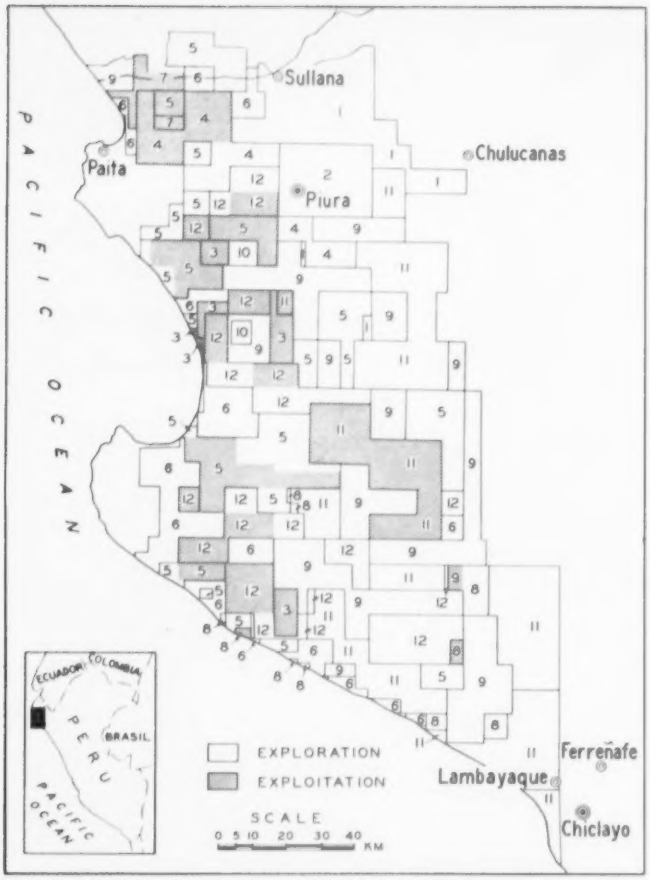

Map of the Sechura Desert region showing the concessions of the 12 oil companies active in this prospective area. Shaded areas are concessions for exploitation and unshaded areas are for exploration. (1) Petrolera Sullana, Ltd., (2) Compania Peruana de Petroleo el Orient, S.A., (3) Compania Sud-Americana de Petroleo, (4) Conorada Petroleum Corp., (5) International Petroleum Co., Ltd., (6) Peruvian Gulf Oil Co., (7) Peruvian Oil Concessions Co., Inc., (8) Peruvian Oil & Minerals, Ltd., (9) Petrolera Peruana, S.A., (10) Petrolera San Miguel, S.A., (11) Richmond Oil Co., and (12) Seaoil, Ltd.

International Petroleum Co. 4-X-1 VIRU, first wildcat in the Sechura Desert of the northern coast of Peru. The well is located southeast of Paita, about 4 miles from the coast.

by J. E. Rassmuss

Peruvian Oil Sought by 18 Companies . . .

New petroleum law is encouraging exploration

INTEREST in Peru has been foremost in South America since the enactment of the new petroleum law in 1952. There are 18 oil companies (14 foreign), including 5 major companies, now engaged in the country. The acreage solicited to September 1, 1953, totals 6,910,763 hectares or 17,076,495 acres, more than the total concession area in Venezuela of about 16.2 million acres and exceeding that of Colombia about five times. The coastal area of Sechura Desert is practically covered by concessions, and 8,508,980 hectares, or 21,025,690 acres, have been applied for in eastern Peru (December 1).

The author is consulting geologist, Lima.

A peculiar feature of the oil development in Peru is the presence of smaller independent companies, including two Canadian and one Argentine. This situation maintains the competitive character of the industry, although some major companies have augmented their interests by operating agreements with smaller neighbors. The existence of four national companies creates a healthy climate of cooperation, which prevails so successfully in the flourishing Peruvian mining industry between the foreign and national operators and capitals.

Future provinces . . . Three prospective areas have attracted oil interest in Peru:

1. The Sechura Desert on the northern coast, which extends south of the already developed fields, which yield 99 per cent of Peru's present production.

2. The southern region of Pisco and Nazca, some 150 to 300 miles south of Lima, where marine Tertiary beds outcrop.

3. The Montaña, the Peruvian Amazon Basin east of the Andes, where oil has been struck in Ganso Azul field and the prospective area comprises about 100 million acres.

Two other oil occurrences, the asphalt outcrops of the Brea de Chumpi,

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northeast of the port of Chala; and, the Titicaca region on the Bolivian border, where some 300,000 bbl. of oil has been recovered, are also of interest for future prospecting.

Sechura Desert

The Sechura Desert is considered as the most immediate prospect. Its easy accessibility by the ports of Paita and Bayovar and the railway to Piura and its geological conditions, similar to or possibly more favorable than those of the adjoining northern fields, encourage its development.

The Sechura Desert is a broad coastal plain about 60 miles wide. It is limited on the east by the foothills of the Andes and on the west by remnants of an ancient coastal range. This range is preserved in the hills of the Cerros de la Silla de Paita (1,300 ft.) and the Cerros Illescas (2,200 ft.), both composed by granite and metamorphic rocks; and in the Lobos Islands farther south, which rise from the Continental Shelf.

To the north the desert is limited by the broad valley of the Chira River, the biggest river of the Peruvian coast. The Chira, running east-west, follows a transverse fault line. North of the river the Amotape Mountains, composed of Pennsylvanian slates, intruded by granite, extend westward to narrow the coastal plain and the Tertiary belt to an average width of only 20 miles. To the south the Tertiary Sechura embayment was open to the Pacific Ocean. The Cerros Illescas and Silla de Paita formed islands in the Tertiary sea, as indicated by the shoreline deposits on their border.

The Sechura Desert was covered by the sea in Quaternary times. Quarternary-raised sea floors, called tablazos, covered with a shell bank, extend great distances, indicating by its different levels the various stages of uplift. At present a gentle warping of its surface must be deduced, because the northern part of the Sechura coast is rising, as clearly shown by the recent pebble beaches north of Paita; while in the south, in Virrilá, the sea is advancing, occupying the old river valley far inland; and east of Reventazón the salt marshes are about 80 ft. below sea level, separated from the ocean by ridges of sand dunes.

The surface of Sechura Desert is flat, covered with sand dunes and a sheet of pebbles from the mountains, so that geological outcrops are missing and the structure can be revealed only by geophysical research.

In the adjoining coastal plain to the north, where producing fields, La Brea-Pariñas of International Petroleum Co., Ltd.; Lobitos and El Alto of Lobitos Oilfields, Ltd.; and Organos and Zorritos of Empresa Petrolera Fiscal, have yielded an accumulative production of 433 million barrels through 1952, the Tertiary sequence, ranging from Eocene to Miocene, is developed in a thickness of more than 20,000 ft., deposited on the Tertiary Pacific shelf, bordering the Amotape Mountains. Regressions and transgressions from the Pacific Ocean have produced an alternation of shales and sands, favorable for oil accumulation and preservation. At the southern boundary of the La Brea-Pariñas concession and on the northern bank of Chira River, the small Portachuelo pool is located on a structure. Oil is found there at about 5,000 ft. in the Salinas formation of Lower Eocene age. This field constitutes the southernmost commercial oil deposit, neighboring the Sechura concessions.

South of the Chira River Eocene beds are exposed on the Sechura coast to Paita, overlain unconformably by Pliocene deposits, covered by the Quaternary shell bank of the tablazo, which extends to the east into the interior. South of the port of Paita the Eocene beds overlie the outcropping metamorphic schists of the Silla de Paita and blocks of Lower Eocene strata are broken down into the older rocks. On the western and southern border of the Silla de Paita, Cretaceous fossiliferous sandstones and limestones are exposed, which indicate the presence of this formation in Sechura. Cretaceous deposits, with the exception of the uppermost Malpaso shales which have yielded some oil in International's field, are not known in the northern oil-bearing belt, but petroliferous Upper Cretaceous limestones are exposed on the northern and eastern foot of the Amotape Mountains. The oil-bearing Cretaceous limestones, similar to those of Colombia and the Cogollo limestone of Venezuela, are one of the big prospects of Sechura, because seismic surveys indicate them to be at a depth of about 8,000 ft.

South of the Silla de Paita and about four miles from the coast, the first well of International Petroleum Co. was spudded in August and completed November 16 at a depth of 7,330 ft. as a dry hole.

Tertiary beds of upper Eocene and Miocene age are newly exposed farther south on the border of Illescas Mountains, overlying the metamorphic rocks in a shoreline facies.

Remarkable oil seepages are exposed on the southern foot of Illescas Mountains at La Garita and Reventazón. Sulfur deposits, produced by the reduction of Tertiary gypsum beds through the oil and gas emanations at Reventazon about 50 years ago led to an attempt at sulfur refining and the construction of a railway from Bayovar. Only some decomposed sleepers have been preserved. About 25 years ago International drilled 12 wildcats near the eastern border of Illescas Mountains and near Reventazon, which gave only some oil and gas shows and were abandoned. Oil seepages are also known near the Silla de Paita.

On the northern border of Sechura Desert Upper Eocene shales outcrop on the cliff of Chira River, but farther to the interior only Upper Tertiary deposits of Miocene and Pliocene age are exposed southwest of Piura, west of the Piura River, and on the Virrila inlet east of Bayovar. Miocene diatomites and marls with gypsum beds form the principal elevation in the desert, the Cerro Ahorcado of 500 ft. altitude, between Piura and Paita.

On the eastern border of Sechura Desert no Tertiary strata are outcropping and older rocks, mostly metamorphized Cretaceous and igneous rocks of the foothills of the Cordillera are raised from the recent sands and gravels. Fault lines limit the basin to the east.

Prospects for oil . . . Outcrops of Eocene beds on the western and northern borders of Sechura indicate the continuation of the Tertiary sequence, productive in the northern adjoining belt, and possibly a fuller development of this sequence because of the wider extension of the basin. Oil seepages on the western border, where the Tertiary strata are pinching out at the surface, the possible existence of oil-bearing Cretaceous limestones, and the occurrence of favorable structures, proved by geophysical studies, provide an encouraging outlook in the active search of oil.

The prospective area of Sechura is almost covered by the new concessions, which comprise 1,905,963 hectares or 4,592,085 acres. International, Richmond, Gulf, Conorada, Union, Richfield, Peruvian Oil Concessions representing American interests, the Canadian Seaoil and Peruvian Oils & Minerals, the Argentine Cia. Sudamericana de Petroleo, and four national companies are engaged in its development. Geophysical work, particularly seismic surveys, have been carried out and are being continued by Carter Oil Co., Robert Ray Co., and United Geophysical Co. The first wildcat has been spudded by International southeast of Paita. The second well is being drilled by Richmond near the southern coast.

The offshore area which, according to the Peruvian petroleum law, extends 200 miles into the ocean, has been opened also by decree of April 24 for

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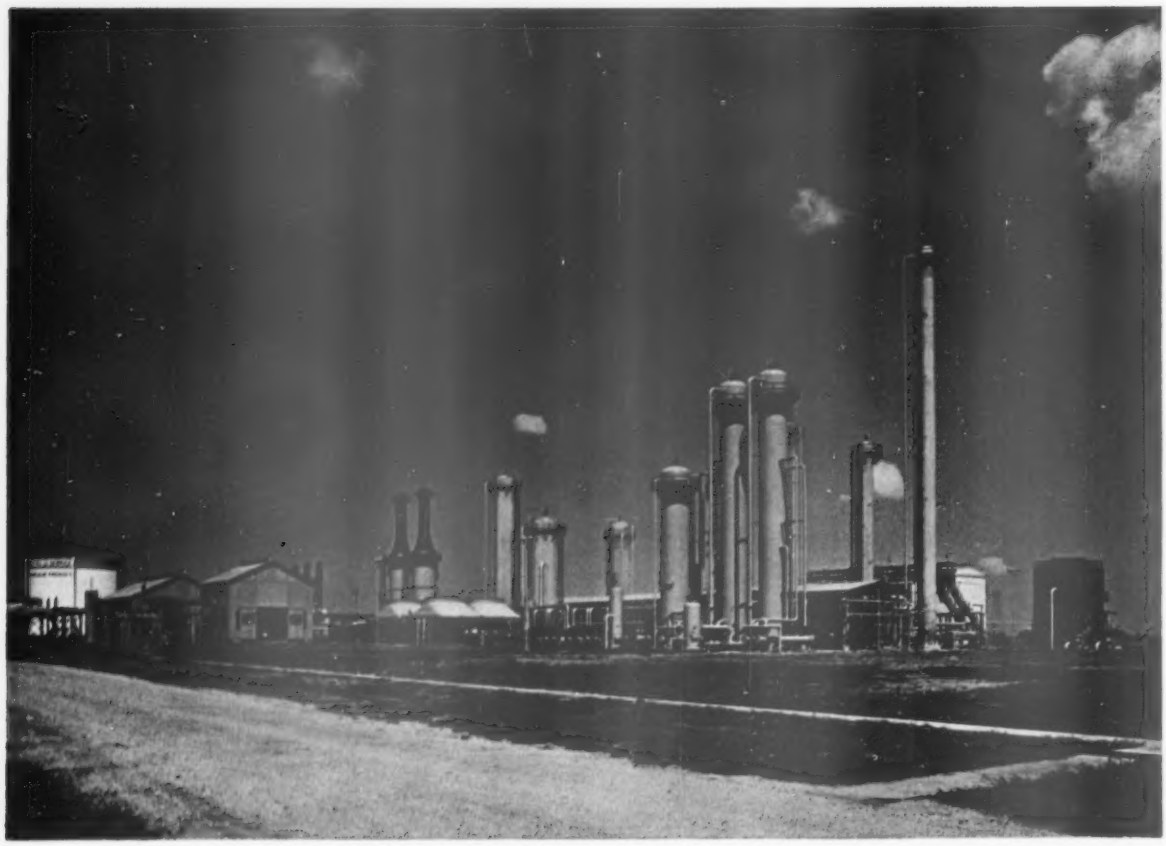

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private concessions from a latitude of 4° 15' S to the south, with the northern part, adjoining the concession of Empresa Petrolera Fiscal, reserved for the government.

The submarine shelf is rather narrow on the northern coast, but broadens in the Sechura Bay and attains a width of about 60 miles in the latitude of Pimentel at the southern end of Sechura Desert, where Lobos de Afuera Island is raised from a depth of about 80 fathoms, near the submarine escarpment to the west.

Patches of oil on the sea have been noted west of Illescas Peninsula, and an oil and gas emanation from the sea exists west of Lobos de Afuera Island. Favorable structures are known to continue below the sea. But the legal provisions establishing very severe drilling obligations heavier than on the land, have so far prevented an active interest in the offshore development. It is hoped that the conditions may be changed to a more realistic and practical approach. Douglas Oil Co., Los Angeles, has entered operating agreement with Lobitas Oil Co. and a new national company, which has applied for concessions on the Continental Shelf, and has spudded the first offshore well in Lobitas Bay.

Southern Region

The Tertiary coastal plain disappears south of Pimentel and Lambayeque at about 7° southern latitude, where it is buried in the Pacific Ocean. Marine Tertiary deposits reappear only in the latitude of Pisco (about 14° S.), a port some 150 miles south of Lima. Near Pisco Miocene diatomites, corresponding in age to those of the Monterrey shales in California, are found in outcrops in a wide belt which is uplifted near the coast in a monocline. The beds continue to the east below the sand dunes of the desert, which extend as far as Ica, and occasionally outcrop in flat position.

Farther south near Paracas, limestones and shales with gypsum beds of Upper Eocene age are exposed on the coast. They cover the coal-bearing Mississippian sandstones and slates of Paracas Peninsula, which constitutes another remnant of the old Coast Range. Farther south the marine Eocene beds continue on the coast until Rio Grande, but they seem restricted to a narrow belt. They cover, in reduced thickness, the heavily broken blocks of the underlying porphyries and other igneous rocks.

Farther east to the interior Miocene deposits overlie mostly porphyritic rocks, forming a more extended basin near Ocucaje, as far as the region of Nazca, but are often interrupted by outcrops of the underlying rocks.

The reduced thickness of Tertiary deposits, which in the south may reach about 1,000 ft. and increase in the Pisco region to 3,000-4,000 ft. The absence of source beds and an impermeable cover make the existence of oil seem unlikely. Near Nazca, however, petroliferous limestones are known.

Some 20 years ago oil concessions were applied for in the Pisco area, but were abandoned later. Recently the Canadian companies Seaoil, Ltd., and Peruvian Oils & Minerals have filed applications for more than 500,000 acres.

Inland from the port of Chala (about 16° S.) at 13,000 ft. altitude large bituminous deposits are located at Chumpi, impregnating andesitic tuffs. They have been produced by volcanic eruptions through Cretaceous, petroliferous limestones.

Near the Bolivian border, on the northwestern shore of Lake Titicaca, oil seepages are found on a fault at Pirin. A Chilean company about 50 years ago drilled a number of shallow wells near the fault, recovering about 300,000 bbls. of oil in this highest oil field in the world, 13,000 ft. above sea level. Cretaceous shales and sandstones and intercalated limestones unconformably overlie Devonian schists and sandstones, which form an anticline north of Pirin. Southern Railways drilled three dry holes on the Devonian anticline. South of Pirin Cretaceous beds are overturned to the east to the tectonic trough of Lake Titicaca. On this complicated monoclinal structure 13 wells were located by the government, one of them yielding 600 bbl. total. Others had oil and gas shows, but none of commercial value. Seepages in this region indicate the presence of oil in the Cretaceous beds, and in areas of less disturbed structure small accumulations may be expected, but only of interest for local consumption.

Amazon Basin

East of the Andes in the densely forested jungle of the headwaters of the Amazon River, called Montaña, numerous oil seepages from the region of the Marañon River in the north as far as the Madre de Dios, affluent of the Beni River, in the south have attracted attention, but the high barrier of the Andes to the west, and the long distance of about 3,000 miles via the Amazon to the Atlantic, have so far prevented its development.

Fossiliferous Ordovician shales outcrop in the eastern part in the center of the Contaya dome east of Contamana. Fusuliniferous limestones of Permo Carboniferous age extend over a large area and were drilled in the first Ganso Azul well from 1,457 ft. to total depth at 3,130 ft.

On the eastern slope of the Cordillera, 21 salt domes are known over an extension of almost 800 miles, out cropping in anticlinal elevations and faults or overthrusts crossing Jurassic or younger deposits. Their age is considered as lower Jurassic or possibly Permian.

Marine Triassic limestones and sandstones are exposed south of the upper Huallaga. While the earlier Mesozoic deposits of the western border of the Montaña belong to the Andean geosyncline, the Upper Jurassic sandstones were deposited in shallow water in an already separated basin, which extended to the west of Ucayali River.

Cretaceous deposits in the Ucayali Basin, which contain the commercial oil accumulations of Ganso Azul, unconformably overlie different older formations, indicating tectonic movements of the Nevadian stage. Regressions and transgressions of the sea from the west and the north have produced an alternation of marine shales and limestones with littoral to continental thick sandstone deposits, favorable for oil accumulation and preservation.

A marine intercalation of dark shales in the lower sandstone group is considered as the source bed of Ganso Azul's oil. The sandstones are overlain by a marine series of limestones and shales with a rich Upper Cretaceous fauna, which is covered by generally light sandstones.

The Tertiary red beds of Eocene to Miocene age, 10,000 ft. or more thick, constitute the predominant formation in the lower parts of the region. Pliocene still slightly warped deposits form in Iquitos the uppermost member of the Tertiary sequence.

The only producing field so far is Ganso Azul, a dome where rich oil sands of high-grade oil of 43°-44°-gravity are found in shallow wells of 917 to 1,230 ft. depth. Well No. 7 produced at the rate of 3,700 bbl. of oil per day on test.

The Peruvian El Oriente Co. drilled three dry wildcats, one in the east on an anticline of the Contamana hills and two on the Pisqui anticline west of Ucayali River. The first well went to 2,600 ft., topping igneous rock at 2,500 ft. The second Pisqui well 9,000 ft. deep, cut about 3,500 ft. of Cretaceous deposits with some oil shows and entered Paleozoic schists at total depth. No other wells have been drilled so far, but active development is expected in the near future. Nine oil companies have applied for 16+ million acres of concessions. Texas Petroleum Co., Socony-Vacuum, Richmond, and Peruvian

(Continued on page 232)

Canadian Output Up 1,100 Per Cent Since 1946

CANADIAN output, nearly all of which comes from the Alberta fields discovered beginning in 1947 with Leduc showed another substantial rise in 1953. The gain of 33.4 per cent compares an increase of 28.2 per cent in 1952 and 66.4 per cent in 1951. Canadian output has expanded elevenfold since 1946, and this year's production satisfies nearly half the country's total consumption of about 500,000 bbl. daily. Seven years ago, before the discoveries in western Canada, production had been stabilized at about 21,000 bbl. daily, less than one-tenth of the country's oil requirements.

Canadian oil producers are looking forward to a continued sizable expansion of production. One particularly encouraging development is the completion this year of two new long-distance pipe lines, the Trans Mountain line to the Pacific Northwest and the extension of the Interprovincial system to Sarnia, Ont. These new year-round outlets will have the effect of eliminating much of the seasonality which has characterized Canadian production.

Production data pertaining to western Canada's four oil and gas-productive provinces — Manitoba, Saskatchewan, Alberta, British Columbia — and the Northwest Territories, are as follows:

WESTERN CANADA

	1953 (Mid-Yr.)
1. (a) Proven oil reserves (million bbl.)	2,041
(b) Est. oil reserves of Athabasca Tar sands (billion bbl.)	250
2. Proven gas reserves (billion cu. ft.)	9,000
3. Land under lease or option, million acres	147
4. Est. exploration and development expenditures (million dollars)	181
5. Geophysical parties (peak)	173
6. Drilling rigs (peak)	217
7. Number producing oil wells	4,039
8. Number gas wells	198
9. Natural gas produced (billion cu. ft.)	56

ALBERTA

	Cumulative (1914-Midyear 1953)
Production—	
Crude oil	284,820,856
Natural gasoline	9,077,217
Total	293,898,073

Revenues of the Alberta Government from the sale of Crown-owned petroleum and natural-gas leases and reservations between April 1, 1946, and midyear 1953, have brought the province $108,685,589 in bonuses (exclusive of rentals and royalties).

Royalties from petroleum and natural-gas production from April 1, 1946, to midyear 1953, have brought the province $39,683,621 and revenue from this source is now in excess of 1 million dollars per month.

CANADA PRODUCTION

Alberta

Name of field—	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Acheson-Stony Plain:										
Lower Cretaceous	1950	3,500	7		1		144	80,199	37-38	L. Cretaceous ss.
D2 Devonian zone	1952	4,760	10				363	139,786	37-38	U. Devonian
D3 Devonian zone	1950	5,075	82				5,615	3,869,190	37-38	U. Devonian dolo.
Alliance	1951	3,140		4	1		30	28,910	26	L. Cretaceous ss.
Armena-Camrose	1951	3,236	216	14	5	9	9,133	3,014,668	36-38	Cret. (Vik. sand) ss.
Armisie	1951	4,040	5	2	3	1	224	168,719	38	L. Cretaceous ss.
Barons	1950	4,100		4			128	81,061	30-34	Cret. (Bow Is.) ss.
Barrhead	1949	3,837			2			4,857	22-24	U. Mississippian dolo.
Bashaw	1951	5,826		2	3		87	83,624	38-41	U. Devonian D3 dolo.
Baxter Lake	1946	1,935	5			1	120	44,023	18	L. Cretaceous ss.
Big Valley:										
D2 Devonian zone	1950	5,200	31		2		1,713	989,931	30-34	U. Devonian D2 dolo.
D3 Devonian zone	1950	5,400	7				295	195,524	30-34	U. Devonian D3 dolo.
Bon Accord	1949	3,580	11				348	180,180	36	U. Devonian D2 dolo.
Bonnie Glenn	1952	6,600	53		1	4	7,911	2,168,003	35-43	U. Devonian D3 dolo.
Bonnyville	1951	1,115	6	3	7	10	100	49,096	14	Cret. (Colony sd.) ss.
Brooks (Bantry)	1947	3,250						79,886	22	L. Cretaceous ss.
Bulwark	1950	3,060						11,790	34	Cret. (Viking) ss.
Campbell	1949	3,700		10	5		92	187,518	30-33	L. Cretaceous ss.
Cessford	1952	2,908			7	3		22,469	25.9	U. Cretaceous ss.
Chamberlain	1952	3,676		4	1		78	14,116	26-27	L. Cretaceous ss.
Chauvin	1952	2,041	7	3	7	9	124	23,893	21-22	L. Cretaceous ss.
Clive:										
D2 Devonian zone	1951	6,130	6		1	2	117	45,963	38-39	U. Devonian D2 dolo.
D3 Devonian zone	1952	6,302	7				180	44,412	38-39	U. Devonian D3 dolo.
Conrad	1944	3,200		15	1		349	1,353,771	26	Jurassic (Ellis sd.) ss.
Del Bonta	1943	5,123		9	2	1	89	153,398	34-37	U. Mississippian ls.
Dina	1929	1,816		1	2	3	35	116,379	9-14	L. Cretaceous ss.
Drumheller:										
Lower Cretaceous	1950	4,445	1		2	1	10	13,693	31-34	L. Cretaceous ss.
D2 Devonian zone	1951	5,376	11				597	286,573	31-34	U. Devonian D2 ls.
Duhamel:										
D2 Devonian zone	1950	4,500	14		2		535	268,130	34-35	U. Devonian D2 dolo.
D3 Devonian zone	1950	4,700	13				727	491,063	34-35	U. Devonian D3 dolo.
Ellerslie	1950	3,850		4	2	1	130	89,766	30	L. Cretaceous ss.
Erskine	1953	5,350	6		2	1	66	11,995	28-29	U. Devonian D3
Excelsior	1949	3,750	34		1		2,288	1,894,463	35-36	U. Dev. D2 dolo.-ls.
Fenn:										
D2 Devonian zone	1951	5,204	39			4	2,299	754,117	30-33	U. Devonian D2
D3 Devonian zone	1952	5,406	1				9	7,280	30-33	U. Devonian D3
Glen Park:										
D2 Devonian zone	1951	5,525	1			1	43	36,722	38-44	U. Devonian D2 dolo.
D3 Devonian zone	1951	6,200	11				774	415,563	38-44	U. Devonian D3 dolo.
Golden Spike:										
D2 Devonian zone	1949	5,050	3			2	159	71,421	38	U. Devonian D2 ls.
D3 Devonian zone	1949	5,980	11				3,587	2,901,153	38	U. Devonian D3 ls.
Joseph Lake	1949	3,300		93	2	6	3,291	2,523,457	37	Cret. (Viking) ss.
Jumping Pound	1944	10,000	4		2		285	170,299	51-57	U. Mississippian ls.

(Continued on next page)

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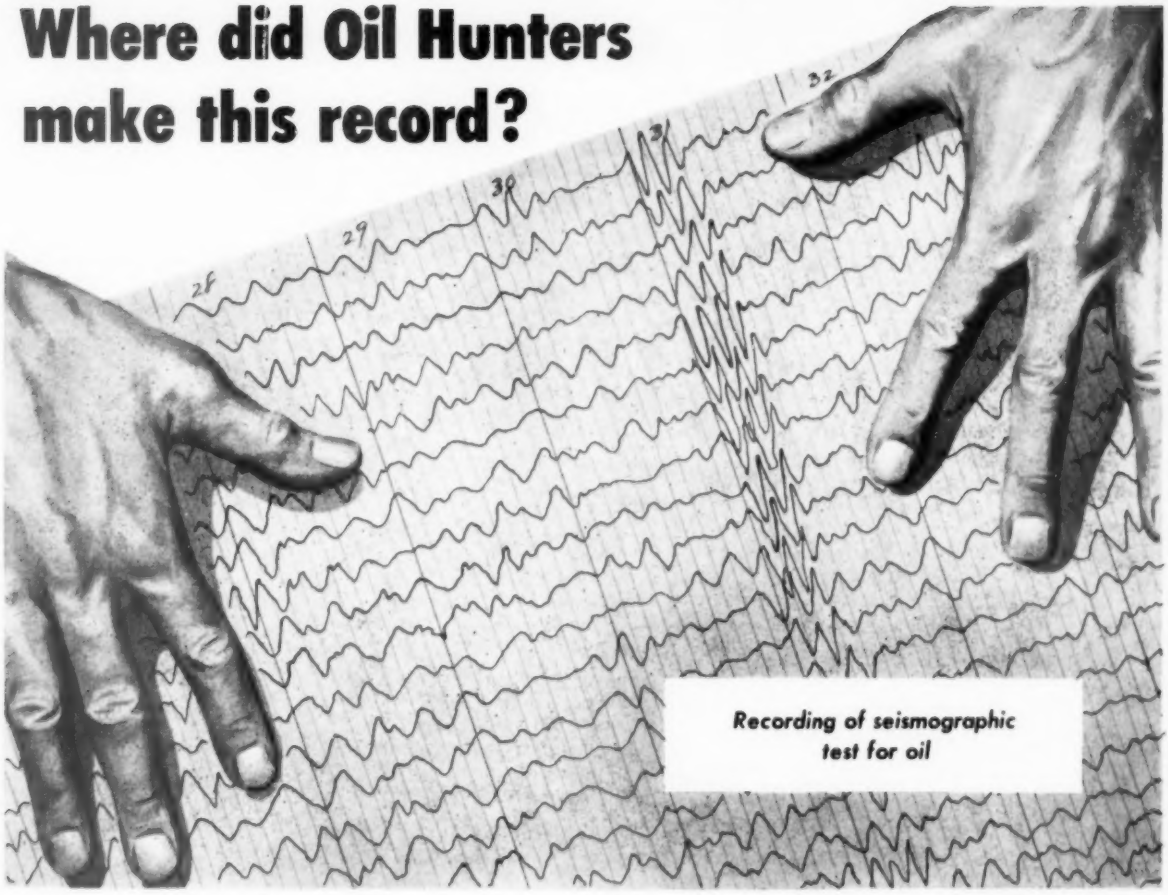

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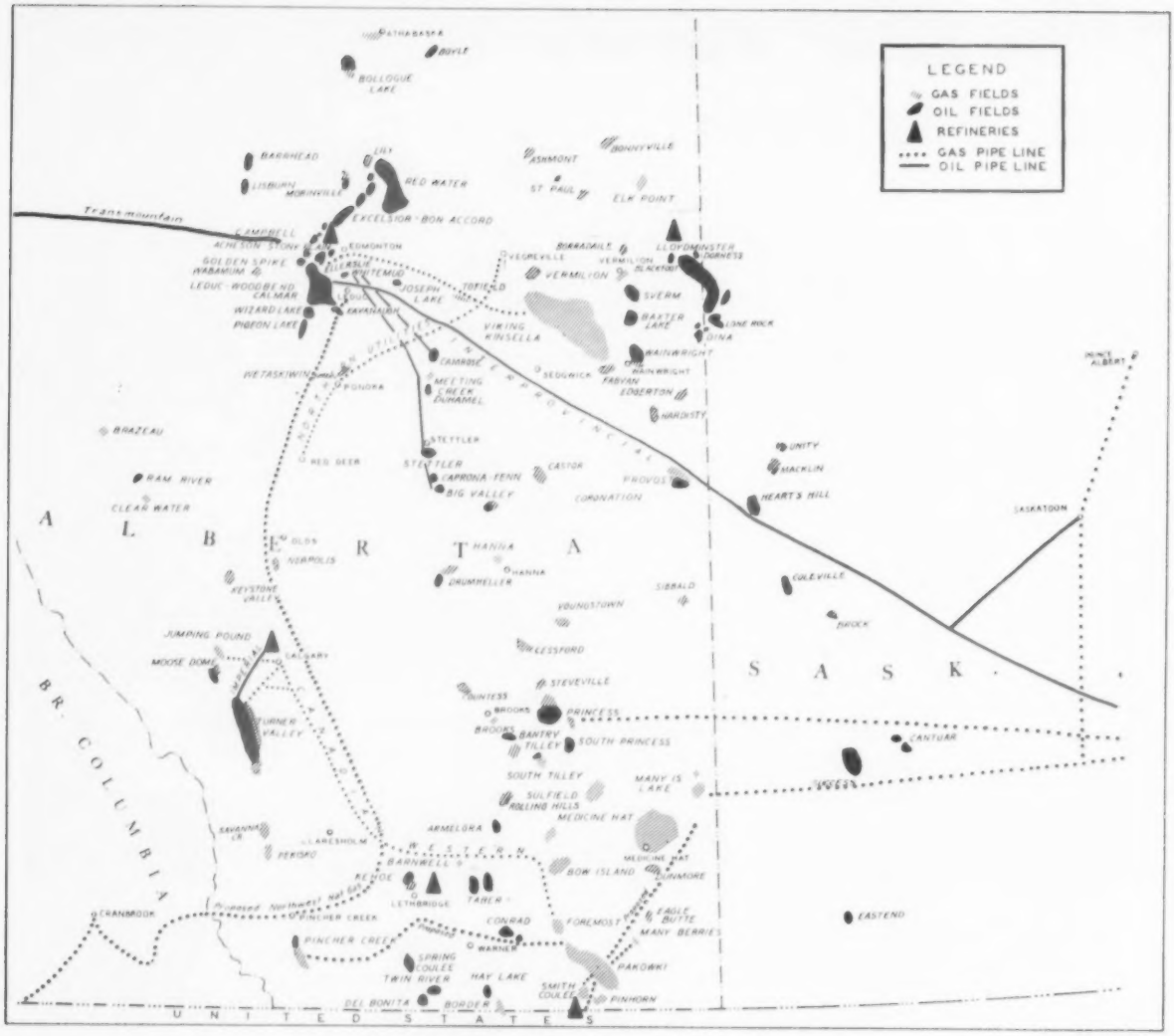

Oil and gas operations in Alberta and Saskatchewan.

CANADA PRODUCTION (Continued)

Name of field	Year of discovery	Depth range, ft.	Number of wells: Flowing	Pumping	Shut in	Drilling	Prod. in bbl.: Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Leduc-Woodbend:										
Lower Cretaceous	1948	4,200		29	1	23	872	1,112,995	35-42	L. Cretaceous ss.
D2 Devonian zone	1947	5,100		601	49		20,983	21,484,482	35-42	U. Devonian D2 dolo.
D3 Devonian zone	1947	5,300		493	2		30,264	43,678,814	35-42	U. Devonian D3 dolo.
Legal	1952	2,755		7		2	162	29,262	35-42	Cret. (Viking) ss.
Lloydminster	1939	1,920		241	100	15	3,966	5,087,233	9-17	L. Cretaceous ss.
Malmo:										
Lower Cretaceous	1952	4,472	6		1		233	53,791	40	L. Cretaceous ss.
D2 Devonian zone	1952	4,910	27				975	351,445	40	U. Devonian D2 dolo.
D3 Devonian zone	1952	5,200	14		1		557	184,080	34	U. Devonian D3 dolo.
Namao	1951	3,645	10		5	1	220	86,026	28	L. Cretaceous ss.
New Norway:										
Lower Cretaceous					1			1,213	32-39	L. Cretaceous ss.
D2 Devonian zone	1951	4,575	10				582	324,322	32-39	U. Devonian D2 ls.
D3 Devonian zone	1951	4,850	6				194	125,113	32-39	U. Devonian D3 ls.
North Big Valley	1952	5,150		19	1	3	163	266,837	31-33	U. Devonian D2 dolo.
Peavey	1953	3,500		4	1	1	103	18,631		L. Cretaceous ss.
Pincher Creek	1948	11,755			2	2		29,288	53-54	U. Mississippian ls.
Princess:										
Mississippian	1945	3,300		5	8		101	893,990	24-32	U. Mississippian ls.
Devonian	1944	3,985								U. Devonian dolo.
Redwater	1948	3,200		901	25	7	55,602	72,738,666	33-36	U. Devonian D3 ls.
Skaro	1952	2,723	1		3		28	12,084	37	U. Devonian D2
South Camrose	1952	3,236	8			1	23	67,397	35-38	Cret. (Viking) ss.
Spring Coulee	1950	6,000		4			21	24,988	35-37	U. Mississippian ls.
Stettler:										
Lower Cretaceous	1949	4,250		2		1	32	51,245	27-30	L. Cretaceous ss.
D2 Devonian zone	1949	5,100	41		21		974	1,167,520	27-30	U. Devonian D2 dolo.
D3 Devonian zone	1949	5,330	21		5		383	506,563	27-30	U. Devonian D3 dolo.

(Continued on next page)

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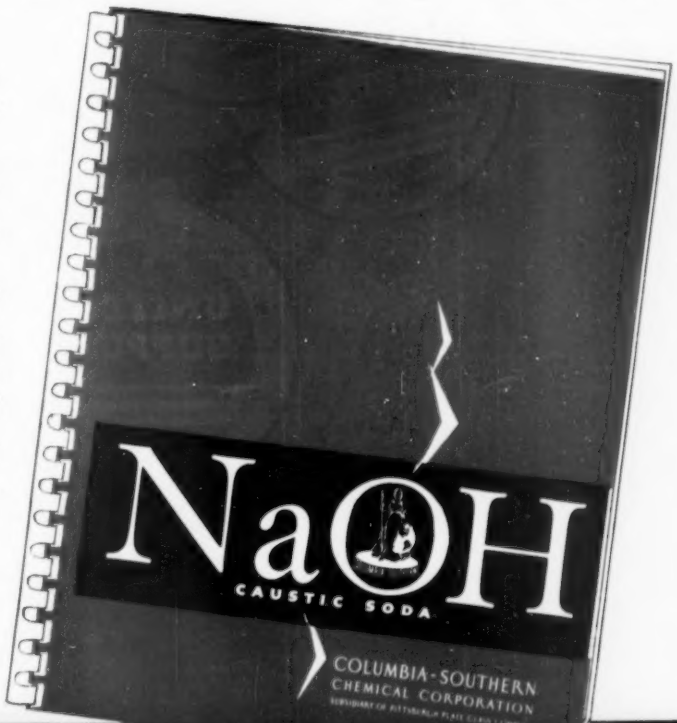
Contains the latest information on Caustic Soda in 64 factual pages of illustrations, charts, tables, diagrams. Includes comprehensive data on methods of analysis, shipping, handling, storage and unloading.

This authoritative handbook, by the Technical Staff of the Columbia-Southern Chemical Corporation, is available without charge to users of Caustic Soda and to others whose work involves the use of this product.

Write on company stationery to Columbia-Southern Chemical Corp., 632 Fort Duquesne Boulevard, Pittsburgh 22, Pennsylvania.



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CANADA PRODUCTION (Continued)

Name of field—	Year of discovery	Depth range, ft.	Number of wells— Flowing	Pumping	Shut in	Drilling	Prod. in bbl.— Daily	Accum.	Gravity, °A.P.I.	Geological data or prod. formation
Taber	1942	3,200		10	10		189	1,604,663	23	L. Cretaceous ss.
Turner Valley:										
Shallow zone	1913	3,100		3	1		6,903	111,872,388	37-41	L. Cretaceous ss.
Limestone zone	1924	3,450-9,150		257	67					U. Miss. ls.-dolo.
Vermilion	1939	1,850		17	14		121	1,332,327	7-10	L. Cretaceous ss.
Wainwright	1923	2,250		14	5	1	163	376,516	20	L. Cretaceous ss.
West Drumheller	1953	5,490		21	1	4	684	123,173	40-43	U. Devonian D2 ls.
Westerose	1953	5,600		6		3	1,931	347,671	40-42	U. Devonian D3 dolo.
Whitemud	1949	4,055	2		2		50	126,824	35	L. Cretaceous ss.
Wizard Lake	1951	6,000				1	5,895	2,947,835	38	U. Devonian D3 dolo.
Saskatchewan										
Buffalo Coulee	1952	2,632		7		1	47	8,644	12-14	Mississippian
Cantuar	1952	3,228		6			82	14,855	23	Cret.-Jurassic ss.
Coleville	1951	2,700		96			1,802	599,543	13-16	U. Mississippian ss.
Eastend	1952	4,800		1		1		1,551	22-23	Jurassic ls.
Fosterton	1952	3,180		4			303	73,894	23	Cretaceous ss.
Hoosier	1952	2,858						4,633	15.7	Mississippian ls.
Lloydminster-Lone Rock	1939	1,885		319		5	3,847	2,021,901	17	L. Cretaceous ss.
Maidstone	1949	1,534		3			13	14,997	26-27	L. Cretaceous ss.
Marsden	1929	2,050		13			98	64,990	13.5	L. Cretaceous ss.
Ratcliffe	1952	6,400				1		4,885	30	Mississippian ls.
Success	1952	3,150		8		3	254	45,735	22 6	Cretaceous ss.
Wapella	1952	2,470		11			100	22,891	25.7	Cret.-Jurassic ss.
Manitoba										
Virden	1951	2,200		38				322,726	33	U. Mississippian ls.
Ontario										
Ontario	1859	500-3,000					611	31,969,995	26-39	Dev.-Ord.-Sil. ls. dol.
New Brunswick										
Stony Creek field	1909	1,000-3,200					42	537,916	37	Miss. (Albert) ss.
Northwest Territories										
Norman Wells	1920	1,050-1,900					875	1,764,541	39	Dev. (Fort Creek) ls.
Total Canada			749	3,255	390	135	182,443	327,668,932		

(1) Includes wells drilling, testing, and standing. (2) 1 bbl. = 35 Imperial gallons.

CANADA REFINING

Company and address—	Refinery location	Type of plant	Charging cap., bbl. per day— Distillation	Therm. crk.	Cat. crk.
Anglo Canadian Oils, Ltd., P.O. Box 99, Brandon, Man.	Brandon, Man.	S-C	3,000	1,400	
Bonnyville Oil Refineries, Ltd., 1502 Mountain St., Montreal, Que.	Bonnyville, Alta.	S	1,000		
British American Oil Co., Ltd., Bay and College Sts., Toronto, Ont.	Calgary, Alta.	S-C-A	7,200	2,500	
	Clarkson, Ont.	Comp.	17,000	4,500	
	Edmonton, Alta.	S-C	7,000	3,500	2,000
	Montreal East, Que.	S-C-A	45,000	3,500	17,500
	Moose Jaw, Sask.	S-C	15,000	4,000	4,500
Canadian Oil Companies, Ltd., 204 Richmond St., West Toronto, Ont.	Sarnia	S-C	20,000	4,000	13,000
Consumers Cooperative Refineries, Ltd., 211 Ave. D, Saskatoon, Sask.	Regina	S-C	7,000	2,450	
Excelsior Refineries, 227 Tegler Bldg., Edmonton, Alta.	Lloydminster, Alta.	S-A	2,500	1,000	
Gas & Oil Refineries, Ltd., 301 Lancaster Bldg., Calgary, Alta.	Hartell, Alta.	S-C	3,000	1,000	
Hi-Way Refineries, Ltd., 714 Broder Bldg., Regina, Sask.	Moose Jaw, Sask.	S	350		
	Rosetown, Sask.	S	350		
	Saskatoon, Sask.	S-C	6,500	5,000	2,600
Husky Oil & Refining, Ltd., Lloydminster, Sask.	Lloydminster, Sask.	S	10,000		
Imperial Oil, Ltd., 56 Church St., Toronto, Ont.	Calgary, Alta.	S-C-A	9,200	4,600	
	Dartmouth, N. S.	S-C	22,000	10,000	
	Edmonton, Alta.	S-C	22,600	9,100	10,000
	Ioco, B. C.	S-C-A	34,500	2,750	7,600
	Montreal, Que.	S-C-A	46,000	14,300	15,500
	Norman Wells, N.W.T.	S	1,250		
	Regina, Sask.	S-C-A	17,000	9,700	7,500
	Sarnia, Ont.	Comp.	57,000	27,000	23,250
	Winnipeg, Man.	S-C-A	12,000	4,370	3,600
McColl-Frontenac Oil Co., Ltd., 360 St. James St., West Montreal, Que.	Edmonton, Alta.	S-C	7,000	2,700	2,600
	Montreal, Que.	S-C	[2]58,000	18,300	[2]21,000
Moose Jaw Refineries, Ltd., Moose Jaw, Sask.	Moose Jaw, Sask.	S-C-A	2,000	300	
New Brunswick Oil Fields, Ltd., P.O. Box 194, Moncton, N. B.	Weldon, N. B.	S	300		
North Star Oil, Ltd., 303 Scott Block, Winnipeg, Man.	St. Boniface, Man.	S-C	4,200	1,000	
Northern Petroleum Corp., Ltd., Kamsack, Sask.	Kamsack, Sask.	S	800		
Prince Albert Refineries, Ltd., Prince Albert, Sask.	Prince Albert, Sask.	S	1,000		
Radio Oil Refineries, Ltd., Monroe and Watt Sts., East Kildonan, Man.	East Kildonan, Man.	S	1,000		
Refinery Operators, Ltd., 213 Sixth Ave., West Calgary, Alta.	Coleville, Sask.	S	5,000		
River Lake Oils, Ltd., Box 191, Island No. 1, Fort William, Ont.	Fort William, Ont.	S-C	2,500		600
Shell Oil Co. of Canada, Ltd., 25 Adelaide St., East Toronto, Ont.	Montreal East, Que.	S-C	38,000	9,000	12,500
	Shellburn, B. C.	S-C-A	10,000	3,875	
Standard Oil Co. of British Columbia, Ltd., 906 Marine Bldg., Vancouver, B. C.	Burnaby, B. C.	S-C	8,350		
Supreme Refineries, Ltd., 523 24th Ave. West Calgary, Alta.	Ogden, Alta.	S-C	1,500	750	
Trinidad Leaseholds (Canada), Ltd., Port Credit, Ont.	Port Credit, Ont.	S-C	7,000	4,200	
Wainwright Refineries, Ltd., Wainwright, Alta.	Wainwright, Alta.	S-A	1,500		
Total Canada			514,600	154,295	143,750

(1) Catalytic cracking 9,000 bbl. daily; catalytic reforming 4,000 bbl. daily. (2) Includes new capacity to be added.

The Texas Co.'s Kentucky, here tied up in Los Angeles Harbor, has a capacity of 240,000 bbl.

Tanker Building Outpaces Increase in Need

. . . so there's a surplus of 150 vessels, 1.8 million tons

by John J. Winterbottom

DURING the first 9 months of 1953, a total of 128 vessels of 6,000 d.w. tons and over, aggregating 2,539,005 d.w. tons, were delivered from shipyards throughout the world. In terms of transportation capacity, this new construction was equivalent to 157.5 T-2 type tankers. (The T-2 tanker is a 16,600-d.w.-ton, 14.5-knot vessel which was built in United States shipyards during the war.) The addition of this amount of tanker capacity to the world tanker fleet exceeded the increase in the need for petroleum transportation, resulting in a considerable surplus of tanker-transportation capacity.

Considering tonnage of 6,000 d.w. tons and over, as of November 1 there were 150 vessels, totaling 1,840,626 d.w. tons, equivalent to 91.4 T-2's, which were in tieup or lying idle in port. Of these, 36.6 T-2 equivalents, or 40 per cent of the total, are of United States flag registry. Higher operating costs under the United States flag, than under all other flags, makes this tonnage most susceptible to financial operating losses under conditions of sagging freight rates.

Author is coordinator of transportation activities for Standard Oil Co. (N. J.), New York City.

Postwar building . . . The postwar tanker-building program in world shipyards, which has produced an increasing number of vessels each year since 1945, caught up with and outpaced the increase in the need for such transportation during the latter part of 1952. Spot charter (single voyage) tanker rates for foreign-flag dirty vessels during the winter of 1952-1953 reached a maximum of former USMC rates plus 10 per cent, and averaged considerably less than this, as compared with rates of USMC plus 200 per cent reached during the previous winter. In terms of dollars per cargo ton this represented a drop in freight revenue from $8.10 to $2.97 for vessels engaged in the Caribbean-United States fuel-oil trade. Although a tanker adequacy had been anticipated as a result of increasing new construction, the drop in freight rates last winter was more severe than had been expected. This was due in part to the considerably warmer than normal weather experienced in the United States East Coast region. Normally, winter demands for heating oil in this area have forced rates upward. Spot-market rates for foreign-flag dirty tonnage have remained low during 1953, averaging USMC rates minus 35 per cent ($1.76 ton Caribbean-New York) during the first 9 months of the year for foreign-flag dirty vessels as contrasted to USMC plus 75 per cent

TABLE 1—ESTIMATED TANKER REQUIREMENTS AND TONNAGE—WORLD-WIDE INDUSTRY—EQUIVALENT T-2'S

	1953	1954	1955	1956	1957
Available year-end tonnage, reflecting allowances for new construction, repairs and obsolescence	1,713	1,929	2,126	2,301	2,376
Peak requirements	1,589	1,658	1,759	1,821	1,912
Surplus	124	271	367	480	464

TABLE 2—TONNAGE AVAILABILITY ESTIMATE

	T-2 equivalents
Tanker fleet as of end 1952	1,509
Estimated 1953 new construction	224
Allowance for obsolescence in 1953	(20)
End 1953	1,713
Estimated 1954 new construction	246
Allowance for obsolescence in 1954	(30)
End 1954	1,929
Estimated 1955 new construction	232
Allowance for obsolescence in 1955	(35)
End 1955	2,126
Estimated 1956 new construction	210
Allowance for obsolescence in 1956	(35)
End 1956	2,301
Estimated 1957 new construction	110
Allowance for obsolescence in 1957	(35)
End 1957	2,376

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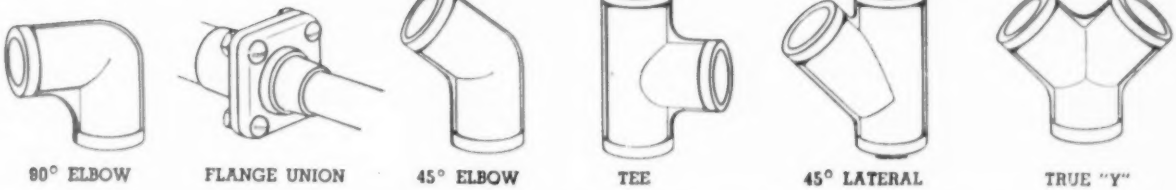

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TABLE 3—TANKERS REPORTED UNDER CONSTRUCTION OR ON ORDER OCTOBER 1, 1953

Yards—	No.	D.w. tons	T-2 equiv.	Contract delivery dates—T-2 equivalent— Bal. 1953	1954	1955	1956	1957	1958	1959	Unknown
United States	36	981,595	67.0	18.5	46.6	1.0	....	....	....	....	....
British	236	4,951,250	312.6	40.3	90.6	72.1	52.7	36.5	8.7	....	11.7
Canadian	2	56,000	3.5	1.8	1.7	....	....	....	....	....	....
Swedish	106	2,188,200	138.1	6.8	47.8	36.4	30.2	12.2	....	....	4.7
Norwegian	37	698,950	44.1	0.9	6.9	10.7	9.8	9.8	4.0	2.0	....
Danish	13	250,900	15.8	2.0	5.4	5.6	2.8	....	....	....	....
French	30	810,800	51.2	4.9	19.8	19.2	3.4	....	....	....	3.9
Spanish	9	142,300	9.0	0.9	4.2	2.3	....	....	....	....	1.6
Netherlands	61	1,256,150	79.3	2.1	24.8	22.6	22.4	5.1	....	....	2.3
Italian	24	550,500	34.8	5.5	24.7	3.4	....	....	....	....	1.2
Belgian	16	304,250	19.2	3.8	9.2	2.4	1.1	....	....	....	2.7
Japanese	14	338,800	21.4	11.1	7.3	....	....	....	....	....	3.0
German	66	1,460,560	92.2	16.7	32.8	21.7	15.9	4.1	....	....	1.0
Total	650	13,990,255	888.2	115.3	321.8	198.3	138.3	67.7	12.7	2.0	32.1

ACTUAL TANKER DELIVERIES

	Jan.-Sept. 1953			1952			1951		
	No.	D.w. tons	T-2 equiv.	No.	D.w. tons	T-2 equiv.	No.	D.w. tons	T-2 equiv.
United States yards	15	384,750	25.5	8	202,300	13.1	4	120,000	8.0
Foreign yards	113	2,154,255	132.0	139	2,508,796	150.5	126	2,086,615	121.3
Total	128	2,539,005	157.5	147	2,711,096	163.6	130	2,206,615	129.3

($4.72 ton Caribbean-New York) in the similar 1952 period.

Last year's tanker-transportation review which appeared in the December 22 issue of The Oil and Gas Journal, indicated tanker surpluses ranging from 139 T-2 equivalents in 1953 to 321 in 1956. The current forecast of the industry tanker-tonnage situation, as of the peak period of this year and the next 4 years, is shown in Table 1. In developing the requirement data, the period of peak tonnage demand, usually occurring about the year end, is used in the forecast as it is considered more representative of the tanker situation than average yearly requirements.

Surplus forecast . . . It will be noted from Table 1 that for the peak period of 1953 a surplus of 124 T-2 equivalents is forecast, as compared with 91 T-2 equivalents which were reported in tieup or idle as of November 1. The forecast for succeeding years indicates increasing surpluses, reaching 480 T-2 equivalents in 1956 and falling slightly to 464 in 1957. Requirements, which are expected to reach 1,589 T-2's this year, increase 20 per cent to 1,912 T-2's by the end of 1957, while year-end tonnage availability increases 39 per cent from 1,713 T-2's in 1953 to 2,376 at the end of 1957.

The tanker-requirement estimates used in the position assume full operation of Iraq Petroleum Co.'s lines to Banias and Tripoli, and the Tapline to Sidon in the eastern Mediterranean. The combined capacity of these lines is 850,000 bbl. per day. The I.P.C. lines to Haifa, which have been shut down for several years because of the political situation in the Near East, are assumed to remain inoperative.

TABLE 4—WORLD TANKER TONNAGE BY AGES AS OF OCTOBER 1, 1953—(6,000 D.W. TONS AND OVER)

(Excluding U.S.S.R. and all military tankers)

Year built	United states flag No.	United states flag D.w. tons	Foreign flag No.	Foreign flag D.w. tons	Total No.	Total D.w. tons
1953	8	195,402	120	2,359,437	128	2,554,839
1952	4	88,676	142	2,635,637	146	2,724,313
1951	2	60,310	126	2,144,541	128	2,204,851
1950	4	110,505	122	2,098,249	126	2,208,754
1949	3	80,102	97	1,720,885	100	1,800,987
1948	1	18,151	48	686,477	49	704,628
1947	1	12,853	29	403,554	30	416,407
1946	2	25,470	40	462,802	42	488,272
1945	73	1,236,379	120	1,880,855	193	3,117,234
1944	95	1,583,489	125	1,962,851	220	3,546,340
1943	122	1,844,165	88	1,256,618	210	3,100,783
1942	35	559,006	41	561,539	76	1,120,545
1941	13	194,215	23	313,664	36	507,879
1940	7	101,899	14	212,423	21	314,322
1939	4	65,245	46	610,458	50	675,703
1938	8	112,592	32	424,928	40	537,520
1937	13	163,567	34	464,056	47	627,623
1936	6	83,660	30	368,809	36	452,469
1935	2	29,760	27	337,590	29	367,350
1934	....	....	8	83,245	8	83,245
1933	....	....	7	113,815	7	113,815
1932	....	....	13	153,595	13	153,595
1931	3	44,650	41	610,800	44	555,450
1930	5	65,676	40	523,917	45	589,593
1929	....	....	23	267,291	23	267,291
1928	4	53,626	33	377,454	37	431,080
1927	2	34,660	24	245,457	26	280,117
1926	1	14,875	9	92,621	10	107,496
1925	....	....	4	43,126	4	43,126
1924	1	10,457	5	49,310	6	59,767
1923	....	....	6	57,074	6	57,074
1922	....	....	11	119,833	11	119,833
1921	2	21,275	24	282,688	26	303,963
1920	3	29,830	17	162,717	20	192,547
1919	....	....	11	121,208	11	121,208
1918	1	8,500	9	89,353	10	97,853
1917	....	....	3	31,080	3	31,080
1916	....	....	5	51,554	5	51,554
1914	....	....	10	120,521	10	120,521
1913	....	....	7	71,496	7	71,496
1912	1	6,150	2	17,780	3	23,930
1910	....	....	1	8,075	1	8,075
1908	....	....	1	7,065	1	7,065
1905	....	....	1	10,600	1	10,600
1903	....	....	1	6,775	1	6,775
1902	1	6,230	....	....	1	6,230
Prior to 1902	....	....	2	20,719	2	20,719
Total	427	6,861,375 (T-2 equivalent 406.4)	1,622	24,544,542 (T-2 equivalent 1,346.8)	2,049	31,405,917 (T-2 equivalent 1,753.2)

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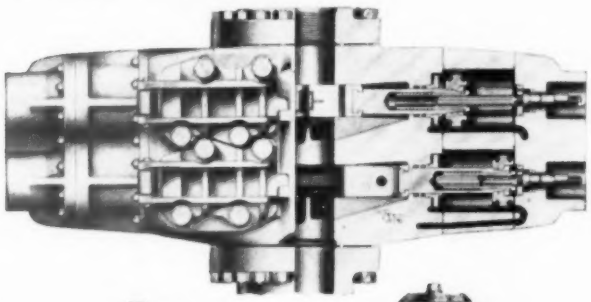

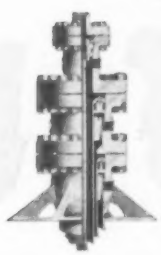

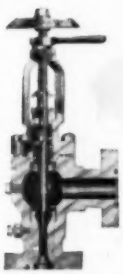

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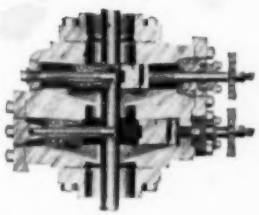

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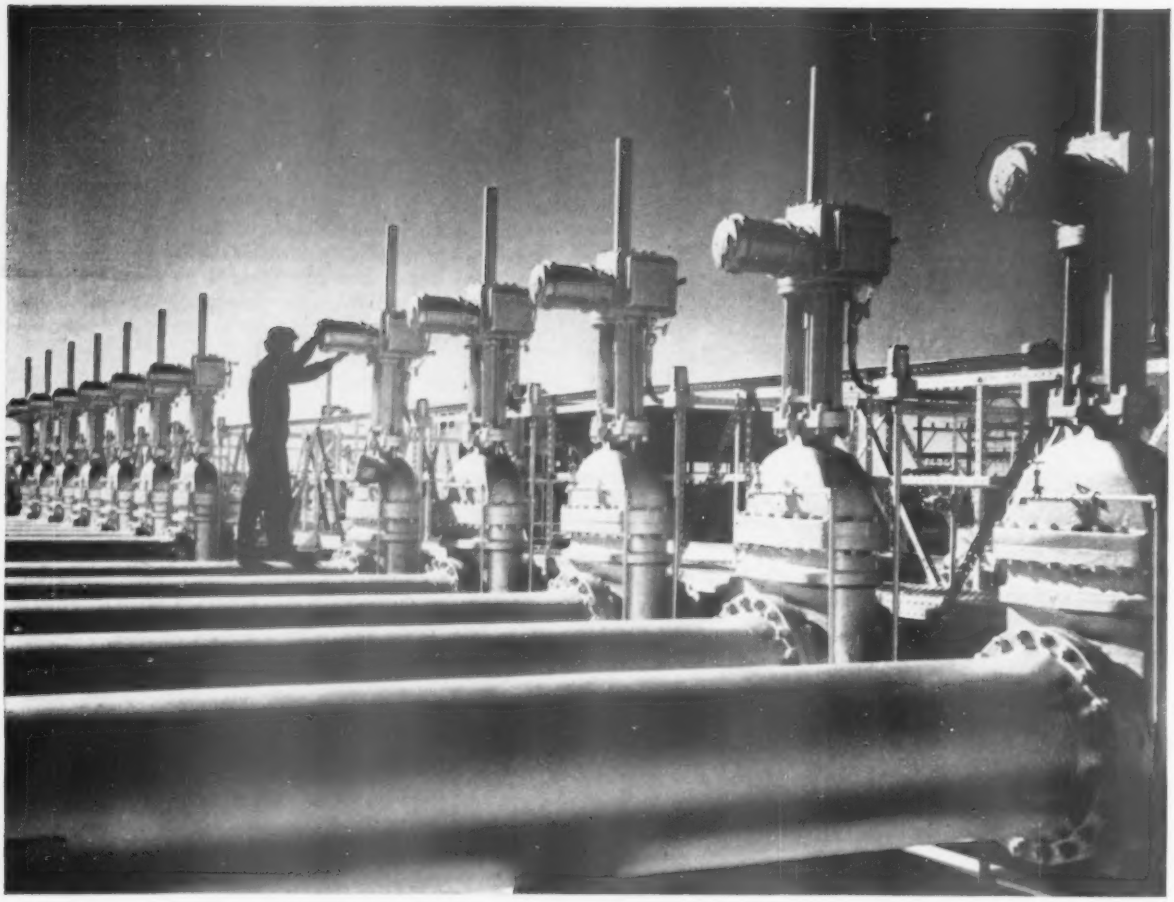

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No Abadan resumption . . . In the preparation of this outlook it has been further assumed that except for local consumption and a very limited amount of exports, the Adadan refinery will not resume operation during these years. The disruption in supply sources caused by the shutdown of this refinery in 1951 has been resolved and there would be only minor changes in tanker needs should operation resume in the near future.

Tonnage-availability figures included in the position are based on actual tankers engaged in world petroleum trades at the end of 1952 (including an allowance for normal repairs, and excluding vessels engaged in the carriage of molasses, whalers, transshipments, and other special services) plus allowances for new construction and obsolescence as shown in Table 2.

As of October 1, 1953, there were under construction or on order in shipyards throughout the world a total of 650 vessels, totaling 13,990,255 d.w. tons, equivalent to 888.2 T-2's as shown in Table 3. This table also lists the amount of new tanker construction during the years 1951, 1952, and the first 9 months of 1953, and future deliveries based on contract delivery dates. However, in projecting the estimated future availability, these contract dates are not considered realistic insofar as foreign yards are concerned. Instead, new deliveries from foreign yards are based on an appraisal of shipyard capacity. Contract dates are used for United States construction as they are considered more likely of fulfillment. This situation is due largely to the proportionately greater ratio of orders to shipyard capacity in foreign yards as compared to those in the United States. No allowance has been made in future tonnage availability figures for the placing of new orders.

It is interesting to note the trend toward large, lower-cost tankers during the postwar period. In 1939, the average tanker in operation was of 11,600 d.w. tons. By mid-1946, largely influenced by the wartime construction of the 16,000-d.w.-ton T-2 type tankers, the average world tanker had

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increased to approximately 13,500 d.w. tons. The present world fleet averages 15,300 d.w. tons, while the 650 tankers presently under construction or on order in world shipyards average 21,500 d.w. tons. The largest tanker presently afloat is a 45,800-d.w.-ton vessel launched at Hamburg last July, and there are several other tankers of similar size now under construction.

With respect to obsolescense the allowance made in future tonnage availability is more or less arbitrary as this factor will be determined principally by the future course of freight rates. Many older, uneconomical tankers were maintained in operation on the strength of the high freight rates which prevailed until late last year. These tankers cannot operate profitably at present freight levels and if, as the forecast would indicate, the tonnage surplus becomes increasingly great there is little doubt that a great many tankers in this category will be forced out of operation. During the first 9 months of 1953, 43 tankers, equivalent to 19 T-2's, were scrapped. These tankers averaged 10,400 d.w. tons, and 30 years of age. If it is assumed that beginning 1954 all tankers 20 years of age, or older, will be retired, the surpluses shown in Table 1 would be reduced to the following:

EQUIVALENT T-2's

1954	1955	1956	1957
149	262	388	376

More than adequate . . . Although the tanker picture over the next 4 to 5 years is one of more than adequacy, the situation may well change as we look beyond this period into the 1960's. Table 4 lists the present world commercial tanker tonnage by year of construction, from which it will be noted that 38 per cent of the world fleet was constructed during the war years 1940-1945. This tonnage will reach 20 years of age during the period 1960-1965, creating a major replacement problem.

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Peruvian Oil Sought by 18 Companies

(Continued from page 219)

Pacific Petroleum Co., a new subsidiary of Cities Service Co., and Union Oil Co. have each taken more than 2 million acres, located mostly in the northern part of the Montaña, on the Marañon, its upper affluents and the lower Huallaga. From Borja, on the upper Marañon, a pipe line of 350 miles length to Bayovar in Sechura Desert on the Pacific Coast, is considered feasible by passing over the lowest gap of the Andes at about 7,000 ft.

Oriente Co., the Canadian company, Peruvian Oils & Minerals, and Ganso Azul Co. have taken other areas in different parts of the Montaña.

In Ganso Azul field, which has been acquired by Texas Gulf Producing Co., drilling, interrupted since 1946, has been resumed and the well No. 9 was spudded in August. Three new wells have been drilled recently. Eight are projected in all.

Crude production of the northern coastal fields in 1952 amounted to 16,203,038 bbl., Ganso Azul produced 200,045 bbl., bringing Peru's total production to 16,403,083 bbl. of crude. For the first 8 months of 1953, oil output of Peru amounted to 10,640,554 bbl., compared with 11,446,798 for the same period in 1952. The principal field of Brea-Pariñas of International Petroleum which yields 70 per cent of the Peruvian production, is declining, having been drilled with 4,377 wells to the end of 1952. Peruvian domestic consumption increased to 10,345,060 bbl. in the same year, diminishing rapidly the exportable surplus. Development of new reserves, encouraged by the new petroleum law, is therefore of urgent need for the country.

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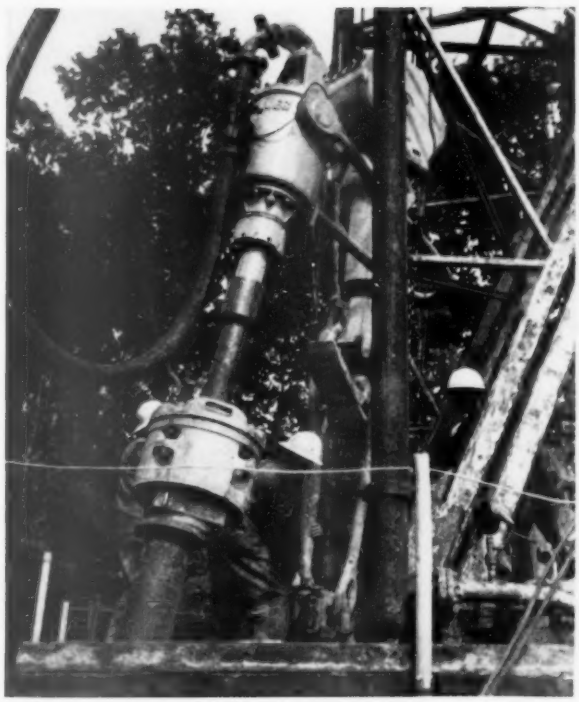


Drilling crew at work in Hemmelte field of the partnership of Gewerkschaft Briggitta-Deutsche Vacuum Oel A.G.

Distillation plant of the Shell refinery at Hamburg-Harburg.

TWELVE NEW DISCOVERIES

West German Production Up 25 Per Cent

Underground reserves estimated at 360 million barrels

by A. M. Stahmer

TWELVE new gas and oil fields have been discovered in Western Germany since the Journal's report in the 1952 International number. Seven new discoveries, some of them of minor importance, were made in the newly developed oil province of Weser-Ems, that forms a link between the Emsland oil district and the Hanover area. Two oil fields and two gas deposits were discovered in the upper Rhine Valley in southern Germany and, finally, a wildcat was brought in in the immediate neighborhood of the town of Hanover.

In 1952 the oil fields of West Germany yielded 12.5 million barrels of crude oil, or 34,000 bbl. per day. This was 28.4 per cent more than in 1951. An output of 15 million barrels or a daily average of about 41,700 bbl. may be expected for the current year, which would signify another increase of about 25 per cent as against 1952. The country is on its way to surpass Peru in the international production list.

The German Geological Survey has estimated the total underground reserves at about 360 million barrels, 245 million barrels being proven, the remainder probable. Owing to the discovery of a dozen new deposits, and in spite of the current yield, this figure will certainly have to be revised in a positive sense in the next calculation of reserves for January 1, 1954.

As of June 1, 1953, 2,425 wells were producing, 327 flowing wells and 2,098 pumpers. At a present average daily production of about 45,000 bbl., a daily average of about 18 bbl. per well.

In 1952 the oil companies drilled a total of 1.53 million feet, and a total footage of 1.77 million may be expected for 1953, about half of that figure in known fields, the other half in exploratory wells or extension wells.

Progress in Weser-Ems

The development of the Weser-Ems district, the newest oil province of Western Germany, has made considerable progress in the course of the last year. And the promising Hemmelte-West field of the joint interest Gewerkschaft Brigitta (Shell and Jersey Standard) Deutsche Vacuum Oel A.G. climbed up to a monthly production of more than 70,000 bbl. Seven other oil deposits were discovered from November 1952 to September 1953. By these oil finds, the gap between the two producing areas of Hanover and Emsland was closed more and more.

The first discovery since Hemmelte-West was made by Wintershall A.G. in its exploratory well Aldorf 1 located halfway between Bremen and Osnabrueck. The well encountered the Cornbrash sands of the Dogger epsilon—which was oil bearing at a depth of 3,673-86 ft.—on an anticlinal structure of the pre-Cretaceous. In addition to this, some production in the meantime also has been developed from the Malm. The crude oil of Aldorf is of

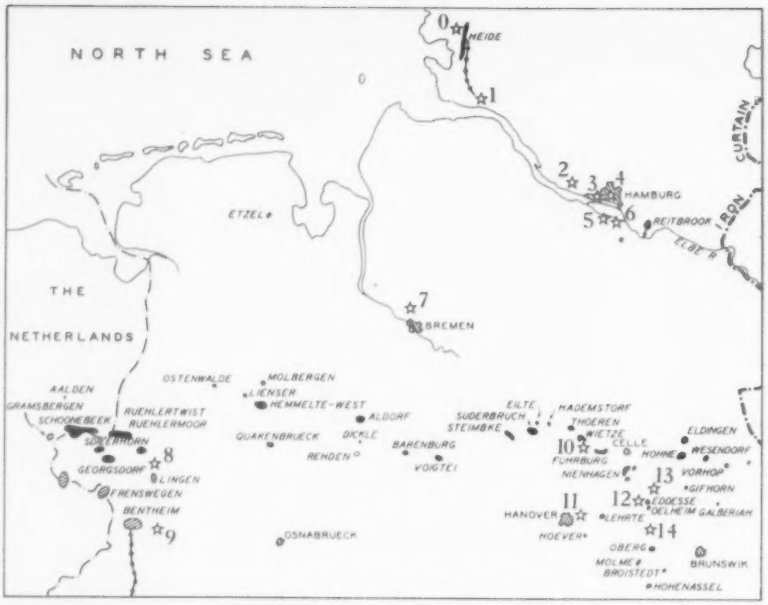
high quality, possessing a favorable neutralization value and a high content of light products. In October 1953 the field had already produced 38,000 bbl. from a dozen productive wells.

At the end of January 1953 the joint interest of Gewerkschaft Brigitta-Deutsche Vacuum Oel A.G. made a discovery some miles north of the Hemmelte-West field with its Molbergen 2 well, which flowed 95 bbl. of crude daily through an 11/64-in. choke from the Gigas beds of the Upper Jurassic at a depth of 2,362 to 2,428 ft. Several of the following wells were disappointing; in November 1953, however, the Molbergen 9 well came in with a yield of 150 bbl. through an 11/64-in. choke, proving that satisfactory results may be obtained in this field.

Early in March 1953 the next discovery was made in a joint concession of Deutsche Vacuum Oel A.G.-Gewerkschaft Elwerath farther east near the Weser River at Voigtei. In the meantime four exploratory wells in the Kimmeridge-Gigas beds had proved productive, yielding daily flows of 55 to 60 bbl. through ⅛-in. chokes. An area of at least 2 miles' length has already been proved as productive.

Soon after, two discoveries of as yet minor importance were made south of the Aldorf field at Dickel and west of the Hemmelte-West field at Ostenwalde. Dickel 1 in a concession of Wintershall A.G. afforded small yields only from the Malm at a depth of 4,560 to 4,590 ft. The hole was shut in to await the results of further drilling, which, however, have not been very encouraging up to the present. The Ostenwalde 1 well of the C. Deilmann-Gewerkschaft Elwerath partnership became a pumper from the Wealden, which was encountered at a depth of 4,249 ft. In October 1953 the well yielded 600 bbl.; further drilling is under way.

In August the exploratory well Barenburg 1 of the joint interest Deutsche Vacuum Oel A.G.-Gewerkschaft Elwerath succeeded in finding oil in the Cornbrash (Jurassic) and in the Valendis (Lower Cretaceous). Barenburg 1 is situated a few miles west of Voigtei field. A daily yield of 150 bbl. through a ⅛-in. choke was achieved initially, the gravity of the crude being 29°. Early in October a gas blowout from behind the casing occurred in the second Barenburg well located about 2,600 ft. west of Barenburg 1. Within a circumference of 650 ft. the gas made its way to the surface through fault fractures in the subsurface. The drilling crew of Elwerath was able to bring the hole under control by killing it with heavy mud. Apparently, there can be expected no commercial exploitation of the gas, though it is hoped to recover some oil from this well.



WESTERN GERMANY—Producing oil fields and refineries are shown on the above. Refinery locations are indicated by a star, and the companies and cities represented by these are: 0. Deutsche Erdoel, A.G. (Heide); 1. Deutsche Erdoel, A.G. (Mawag); 2. Socony-Vacuum Oil Co. (Hamburg); 3. Anglo-Iranian Oil Co. (Hamburg); 4. Oelwerke Julius Schindler (Hamburg); 5. Standard Oil of New Jersey (Hamburg); 6. Shell Oil Co. (Hamburg); 7. Socony-Vacuum Oil Co. (Bremen); 8. Gewerkschaft Erdoel-Raffinerie (Lingen); 9. Wintershall, A.G. (Salzbergen); 10. Deutsche Erdoel, A.G. (Wietze); 11. Gewerkschaft Deurag-Nerag (Misburg); 12. Georg Greiser Bergbau und Chemische Fabriken Mineraloelwerke Hermann Pfeifer (Dollbergen); 13. Mineraloelwerke Albert Sengewald (Dedenhausen); 14. Oelwerke Julius Schindler (Peine).

In September the Liener 2 well west of the town of Cloppenburg in the joint concession of Gewerkschaft Brigitta-Deutsche Vacuum Oel A.G. was brought in with an initial flow of 100 bbl. daily through an 11/64-in. choke from Kimmeridge beds at a depth of 2,600 ft. Further drilling will have to determine the extent and economic importance that may be attributed to this new deposit. The same as all other new fields, the discovery at Liener is the result of thorough and extensive seismic reflection surveys.

Oil Highlights for Rhine Valley

A series of oil and gas finds have again drawn attention to the Upper Rhine Valley graben, in which Germany, France and, to a minor extent, also Switzerland, all participate. Oil exploration in this area looks down upon a long history, which, in the last decades, had not been too encouraging to the companies. In August 1951 a gas blowout took place at Wolfskehlen near the town of Darmstadt in the northern part of the Upper Rhine Valley. While Wolfskehlen had proved to be an uncommercial fractured deposit only, other wells drilled later several miles farther south proved successful in finding both oil and gas.

Early in December 1952 the Stockstadt 1 well in a concession of Gewerkschaft Elwerath was brought in through a ⅛-in. choke with an initial flow of 380 bbl. of light crude (gravity 40°). Outstanding is the fact that the oil was derived from the Pechelbronn beds of the lower Oligocene, the pay in the French field of Pechelbronn, which had formerly not been expected to reach so far north. Two further wells had become productive in the meantime, one of them from a gas deposit of the Tertiary (Miocene), although its economic value has not yet been defined. In October 1953 the new Stockstadt field delivered more than 20,000 bbl. of crude.

Almost simultaneously with the Stockstadt discovery, gas was also found by Deutsche Erdoel-A.G. in the Pfungstadt 2 well several miles east of Stockstadt in the Hydrobia beds of the Tertiary. Two further wells, Pfungstadt 3 and 4, came in in marly lime horizons of the Hydrobia beds between 2,297 and 2,854 ft., and production tests made in October proved each of these wells to deliver 50,000 to 53,000 cu. ft. of natural gas per hour without any significant pressure decline. A contract concluded between Deutsche Erdoel-A.G. and Farbwerke Hoechst

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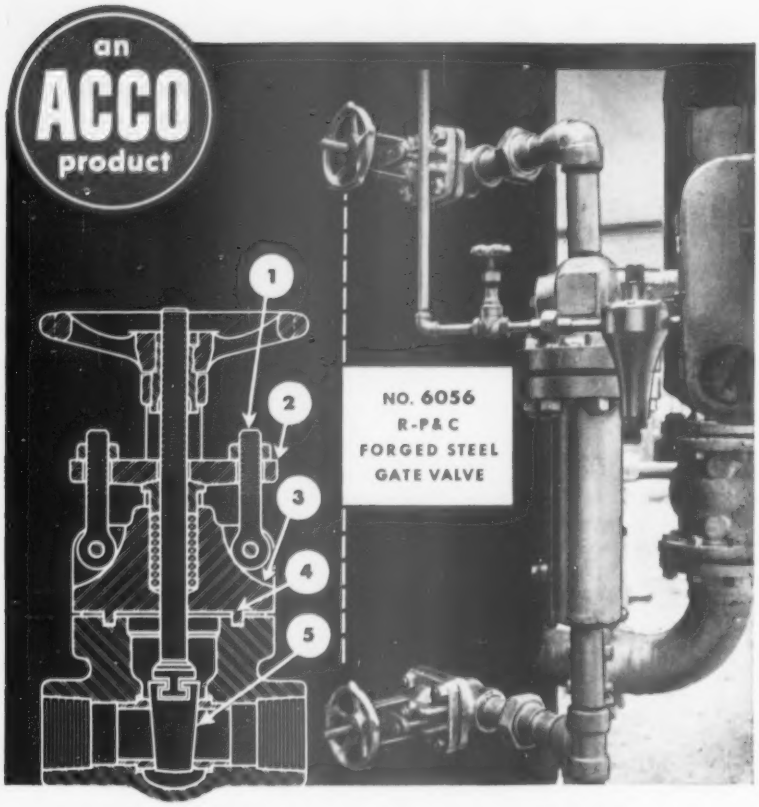

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Hanover still stays in top position on production list of the German fields.

(former I. G. Farben) anticipates deliveries of the gas to the Hoechst factory through a proposed 22-mile pipe line. At Hoechst the gas will be used for the manufacture of petrochemicals.

On the left bank of the Rhine River southwest of Stockstadt another wildcat of Gewerkschaft Elwerath, Eich 3, encountered natural gas in the Tertiary at a depth of about 1,510 ft. It is hoped that Eich may be commercially exploited as a natural-gas field.

By the end of January 1953 the exploratory well Rot 3 of the joint interest Wintershall-Itag was brought in south of Heidelberg with an initial production of 100 bbl. of medium-quality crude (gravity 25°) from the oil-bearing lettenkohle (Keuper). While Stockstadt and Pfungstadt are anticlinal structures in the center of the Rhine Valley graben, the structural type of the Rot deposit is a tilted fault block, the same as in the old fields near Bruchsal.

A similar structure was explored by Deutsche Erdoel-A.G. north of the old Weingarten field. In October 1953 both wells Untergrombach 1 and 2 of Deutsche Erdoel A.G. came in with a small production of several barrels daily from the Pechelbronn beds. It has not yet been determined whether regular production will at all be feasible at Untergrombach.

Promising Outlook for Hanover

While new oil-producing areas were developed between the Ems and Weser rivers and in Southern Germany, the old Hanoverian oil province is far from being overshadowed by them. Hanover is still keeping the top position in the production list with its output of about 550,000 bbl. in October. Recently, a discovery was made in the immediate neighborhood of the Technical Exposition territory at Hanover-Laatzen in a joint concession of Gewerkschaft Elwerath-Preussag. At a depth of about 1,970 ft. the well Hoever 5, which was later renamed Kronsberg 1, struck heavy crude on the flank of the elongated salt structure, on the northwestern edge of which Preussag had already been developing the Lehrte field since September 1952. The Cornbrash of the Dogger is oil-bearing at Kronsberg, the same as in the Lehrte field.

A remarkable result was also achieved in the Vorhop 6 wildcat of the Gewerkschaft Elwerath - Preussag combine, which was successful on the western flank of the salt dome of Vorhop with an initial flow of 1,600 bbl. of light oil with a high wax content

Total crude capacity of West German plants will reach 78,000,000 bbl. in 1954.

from a sandstone of the Dogger beta. On the southeastern flank of the same salt structure Preussag had already encountered an oil deposit of apparently minor importance in 1952.

Refining Capacity Continues Upward

In the framework of the OEEC refinery-capacity-expansion program, further mineral-oil processing plants were erected and put on stream in the course of the last 12 months.

Socony-Vacuum's affiliate, Deutsche Vacuum Oel A.G., added a Thermofor catalytic cracking unit to its works at Bremen-Oslebshausen. A similar plant was erected at the Gelsenberg hydrogenation works at Gelsenkirchen-Horst. A thermal cracking unit was built on the site of the hydrogenation works of Union Rheinische Braunkohlen Kraftstoff A.G. at Wesseling near Cologne and mineral oil processing was switched over to a three-stage system, first topping, secondly cracking the residue, and thirdly, hydrogenation of the cracking residue.

A considerable enlargement is under way at the Standard Oil Co. (N. J.) plant at Hamburg-Harburg, which is to treat 12.6 million barrels of crude in 1954, and at the Anglo-Iranian refinery at Hamburg-Finkenwerder. A catalytic cracking unit is being erected at the Esso plant at Harburg, and at BP (Anglo-Iranian), Finkenwerder, a distillation and Platforming unit is near completion. BP is to run 8.4 million barrels of crude in the course of the next year.

As formerly reported, Gewerkschaft Erdoel-Raffinerie Emsland, common affiliate of Wintershall A.G. and Gewerkschaft Elwerath, is building a new refinery at Lingen-Holthausen near the Emsland oil fields. This plant was ready for operations in August 1953. When the foreign contractors were engaged in putting the plant on stream, a fire broke out and a part of the cracking tower was damaged. Lingen hopes to start operations after completion of the repairs early in 1954 with an annual throughput of 3.5 million barrels of Emsland crude.

The total annual crude intake capacity of the West German refineries was 57 million barrels early in 1953. It is anticipated that this capacity will be increased to 78 million barrels up to the end of 1954. This means that it will be possible completely to cover the indigenous mineral oil demand of Germany by the country's own refining output.

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Exploration Logistics in Saudi Arabia

(Continued from page 186)

the main power plant of 30-kw. capacity and 20-kw. auxiliary plant; this unit also contains a small shop compartment with air compressor, battery charger, welding equipment, and a work bench with small power tools; and a lavatory compartment equipped with washbasins and showers, with hot and cold running water. The second is a kitchen unit with complete cooking facilities, a refrigerator compartment with about 100 cu. ft. of chilled and frozen food storage, and a small commissary storage compartment. The third trailer is air conditioned and is an office unit divided into two compartments. The forepart is the operations office and contains the radio-communication units. The rear compartment is a geological office and laboratory where the drill cuttings are washed and examined with binocular microscopes. The three trailer units are served by a pressure water system operating from a 350-gal. storage tank in the utility unit.

Sleeping quarters are provided by small canvas tents about 10 ft. square for individual occupancy. Cables from the utility unit supply the tents with electricity for lights and fans. A lean-to type tent erected on one side of the kitchen trailer serves for the eating and recreation facilities. The general Saudi employes, truck drivers, mechanics, and cooks, occupy larger tents. The drill-rig-crew helpers live in tents at the drilling site.

The problem of keeping tents intact in a country where violent sandstorms are a normal occurrence is a serious one and trials have been made to set up sleeping quarters in trailers. Two old office units have been converted for this purpose and have proved to be very satisfactory. It is necessray, however, to completely air condition these sleepers as the air temperatures during most of the field season are so high that the interior of the trailers becomes unlivable without air cooling. This in turn requires a larger main generator to supply the additional power. However, an economic analysis indicates that these additional costs are practically offset by the continual replacement of tents and a program for providing more sleeping trailers is being considered.

Drilling for Structure

The structure drill rigs are completely unitized on semitrailer mounts. Two types are in use, one is the Joy Model 300 rotary drill and the other is the Bucyrus Erie 36L spudder. Frequently both type rigs are used interchangeably on the same field party, depending on the nature of the formation being drilled. The trailer frame on which the rigs are mounted is about 40 ft. long and the over-all assembled width, including the catwalks, is about 12 ft. The running gear consists of a dual-axle dolly mounted with dual 16:00 by 20 sand tires on each wheel.

Mounted on the trailer with the draw-works unit is a 5 by 8 mud pump, a 5-kw. light plant, air compressor, 300-gal. fuel tank and all other accessories needed to operate the rig. The rig is powered by General Motors diesel engines with torque converters on the rotaries and with hydraulic governors on the spudders. Each drilling rig is accompanied by a drill tender on which is carried drill pipe, casing, mud, cement, and all the other materials required for drilling the holes. This trailer is a 30-ton flatbed semitrailer with the same running gear as the drill trailer. A hinged platform is attached to the rear of the drill tender and in operation on location, the drill tender is backed up to the rear of the drill trailer and this platform is lowered next to the rotary table and serves as the working platform. A portable canvas tank of 3,000-gal. capacity provides water storage for the mud stream.

To make the move from one location to the next, the drill trailer and tender are pulled in tandem by a D-8 Caterpillar.

Each drill rig is served by a water carrier consisting of a semitrailer tanker of about 2,500-gal. capacity. This tanker is drawn by a tractor truck and the water is usually supplied from a nearby structure hole that was completed as a water well. Ordinarily, the field camp is made at one of the water wells so as to control the dispatch of the water carriers to the two rigs. At some places it is not expedient to put the campsite at a water well and it then becomes necessary to haul water for camp needs also.

Hauling supplies to this field party is usually done with two large six-wheel-drive 300-hp. tractor trucks pulling 4,000 and 6,000-gal. tanker semitrailers and 30-ton cargo trailers, often in tandem. This field party is made up of 2 geologists, 1 drilling foreman, 1 mechanic, 5 drillers working two tours per day, and about 75 general employes.

As mentioned previously, a mobile commissary supplies the food requirements and personnel are rotated by regularly scheduled airlifts.

A great deal of Aramco's definitive geological investigation has been by structure drill; the wildcat locations for the Abaqaiq, Qatif, Fadhili, Ain Dar, 'Uthmaniyah and Haradh discoveries were made following structure drill surveys.

Source of Water

As in any other area where the field work is remote from the main base of operations, the problem of a water supply for the field parties becomes very important.

While it is possible for the small mapping parties, consisting of two geologists with about eight helpers, to carry sufficient water with them to last for a period of 2 weeks, it would require a fleet of tankers and cost many thousands of dollars to attempt to haul water any distance to support a seismograph crew using from 12,000 to 20,000 gal. of water per day. Fortunately, it has been possible to develop water by drilling wells in most of the area so far explored. However, this has required wells up to 2,000 ft. deep in some places. Static water levels vary from 60 ft. above the ground to about 600 ft. below the surface.

The flowing wells have presented their own brand of difficulties in the drilling stage, for it is necessary to have a well-cemented string of casing with adequate blowout preventer heads to control the high-pressure flowing water when it is encountered. On the other hand, the deep-well pumping installations have created their own problems under pressure of providing a large volume of water continuously. To be a large extent the Peerless Hi-Lift type of rotary pump has been used in the deep wells and has proved to be very satisfactory. Lately, the oil-well-type jack pump has been used with excellent results.

The drilling and maintenance of these water wells is a part of the individual field party operations and responsibility. Water-well drilling units are provided in the areas where necessary, and the frequency of the water well locations is determined by the type of work done by the field party. The quality of water normally is poor. This is due to the high concentration of dissolved salts which on the average is around 2,000 p.p.m. The local inhabitants are accustomed to this range of salinity and present no problem of drinking-water supply. The American personnel, however, are not able to drink this concentration without real discomfort. Therefore, it is necessary to provide them a sufficient quantity of distilled water for drinking and to make an acceptable brand of coffee.

Occasionaly small areas have been found where the salinity of the well water drops to around 1,000 p.p.m. While portable distillation units could be used for purifying the water, there are certain disadvantages to this method under field camp operation. Some of the newer methods of demineralization are probably more suitable and are now awaiting field tests.

Projections of European demand are hard to make because of political considerations which are almost impossible to qualify. Here is a recent one from Washington.

What's the Picture in Europe Today?

There are signs that the product price structure is weakening

by Cornelius J. Dwyer

MOST of the American companies operating in Europe have been in business there for many years and are extremely wise in European ways. But those ways are fast changing, and the companies must remain extremely alert and flexible in order to change their approach with changing conditions.

Projections of European demand are particularly difficult to make because of the great influence exerted by government policies upon both the composition and the rate of growth of petroleum demand. These policies, in turn, are influenced to a large extent by political considerations which are almost impossible to qualify.

Higher crude prices . . . Political factors are important everywhere, not just in Europe, and it is likely that they will have more of an effect on crude-oil prices in the next 5 or 10 years than economic ones. If this is so, it can be expected that United States and world crude-oil prices will increase in relation to the general price level in the United States during this period. This level may go down a bit during the next 2 or 3 years, but if so, crude prices probably will remain relatively stable until the prices of other commodities start upwards once again.

This expectation of higher prices is based primarily upon the assumption that the trend in the direction of greater coordination of policies among oil-producing countries will become more pronounced in the next few years. Most such countries are likely to adopt the policy of cutting back production in periods of surplus, however, much they may disagree among themselves as to the exact amount of the reduction each should make.

Lesser factors working for high prices include: (1) increasing costs in the United States, (2) the desire of the governments of oil-producing countries abroad for higher incomes, (3) probable increases in the price of natural gas and of electric power in America, and (4) the long-term trend toward increased coal costs in most parts of the world. Factors working to keep price increases within bounds are: (1) the large reserve availability in the Middle East, (2) consumer resistance expressed both economically and politically, (3) actual competition from other sources of energy, and (4) potential competition from shale oil and liquid fuels made from coal.

It is possible that the imposition of a high tariff or strict quota on imports by the United States would result in an almost complete divorcement of United States prices from those in the rest of the world; although even in this event United States prices would probably continue to be a kind of reference point.

Author is acting chief, Industrial Specialists Division, Foreign Operations Administration.

New price basis . . . There are likely to be major changes, however, in the product price structure abroad, particularly in Europe. There are signs that this structure is weakening even now. Although nearly all of the bulk products consumed in Europe are produced from Middle East crude oil, prices are still based on the old Caribbean plus formula—which produces the anomalous result that the closer a Mediterranean country is to the principal source of its crude oil, the higher its product prices are. Sooner or later, competition is bound to change this structure to one closer to the delivered price of the crude oil plus a fluctuating refinery margin, as in this country.

Since Middle East crude oil can be delivered at a lower cost to Europe than United States crude oil can be delivered to the northeast of this country, a break in the present product pricing structure might even result in prices in Europe—before taxes—being lower than in the major industrial centers of the United States. If an increase in the United States tariff or a rigid import quota should widen existing differential between United States and Middle East prices, Europe might acquire a real competitive advantage in the form of much cheaper basic energy. However, taking full advantage of such an opportunity would require a major revision of present European attitudes on the use of oil.

Taxation influences demand . . . The

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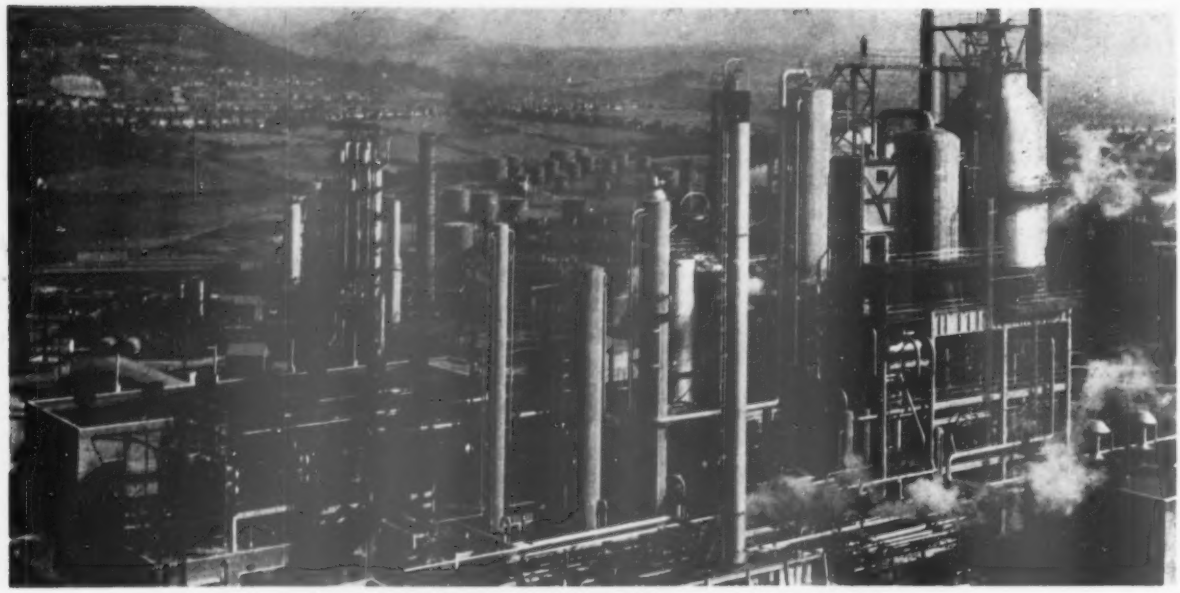

Refinery of Anglo-Iranian Oil Co. at Llandarcy, Wales, with catalytic unit in foreground.

product mix in Europe is considerably different from that in the United States and there are increasing signs that United States gulf prices for the various products, based on the United States product mix, are not suited to Europe. The demand in Europe for middle distillates and residual fuel oil is proportionately much greater, and the demand for gasoline much less, than in the United States. Gasoline consumption is restricted by high taxes on both the product and on the motor vehicles which consume it.

Differential taxation on competitive products further distorts demand. In Italy and in Germany, in particular, the use of diesel fuel is greatly encouraged by relatively low taxes. One consequence has been recurring surpluses of gasoline coupled with shortages of middle distillates.

Besides the problems raised by differential taxation, the generally high level of taxes increases the difficulty of making necessary adjustments in demand by price changes. For instance, in Italy, the price of gasoline at the pump averages 76 cents per gallon, mostly taxes. If the gasoline were given away at the refinery, the price to the motorist would go down by less than one-fifth. Thus it is very hard, even over the long run, to increase demand for a surplus product by price cuts.

Dollar oil vs. sterling oil . . . Since the war, Europe has been preoccupied with the dollar problem. The United States acquiesced in its effort to conserve scarce dollar exchange by restricting nonessential imports from the dollar area, as well as essential imports for which reasonably satisfactory substitutes could be obtained at moderate prices from soft-currency countries. The Foreign Operations Administration and its predecessors were required by the Congress to insure that aid dollars be spent only on needed items which could not be obtained with available soft currencies.

Petroleum policy did not fit easily into this framework. On the one hand, within a year after the start of the Marshall Plan, surpluses of "sterling" oil became available despite very large increases in demand. At the same time, since most so-called "dollar oil" actually was produced outside of the United States by American companies, the possibility of reducing the dollar element in its costs of production had to be recognized. Furthermore, overriding political and strategic considerations dictated that the United States could not support a policy which might have lost its nationals valuable concessions in vital areas of the world and the nation the friendship of the peoples of those areas. So the agency adopted a policy of assisting and encouraging the American companies in their efforts to increase the nondollar element in their oil while opposing efforts to discriminate against "dollar oil."

The companies producing abroad have succeeded remarkably well in reducing the net dollar cost of their oil to Europe, its colonies and the sterling area—so well that calculations indicate that in 1952 the dollar element in the wholesale price of the petroleum products provided to Europe and its associated monetary areas by the American companies from offshore sources, was less than 45 per cent. The dollar element in the price paid by the consumer, which includes taxes and distribution costs, represented a much lower percentage of the total.

The dollar-oil problem is thus no longer serious, so far as Europe is concerned. The companies are making and will continue to make further progress in their efforts to increase their purchases within the area.

The American companies operating abroad will have to continue and extend present policies for the foreseeable future. But discrimination in favor of sterling oil is no longer a problem. Here and there, a country may cut its dollar allocation for oil and ask British companies to take over a portion of the market formerly held by American companies. But these would be isolated cases.

The American companies for some time have been required by a number of European countries to make local purchases equal to a certain percentage of the value of the oil sold. The British companies have not had to do this so far, although several continental nations have a sterling problem, too. If this requirement should be imposed upon the British companies also in these countries, the American companies might actually obtain a competitive advantage, since they have had so much more experience in procurement on the continent.

Attitudes influence demand . . . Price, currency complications, even the depletion allowance—all fade into insig-

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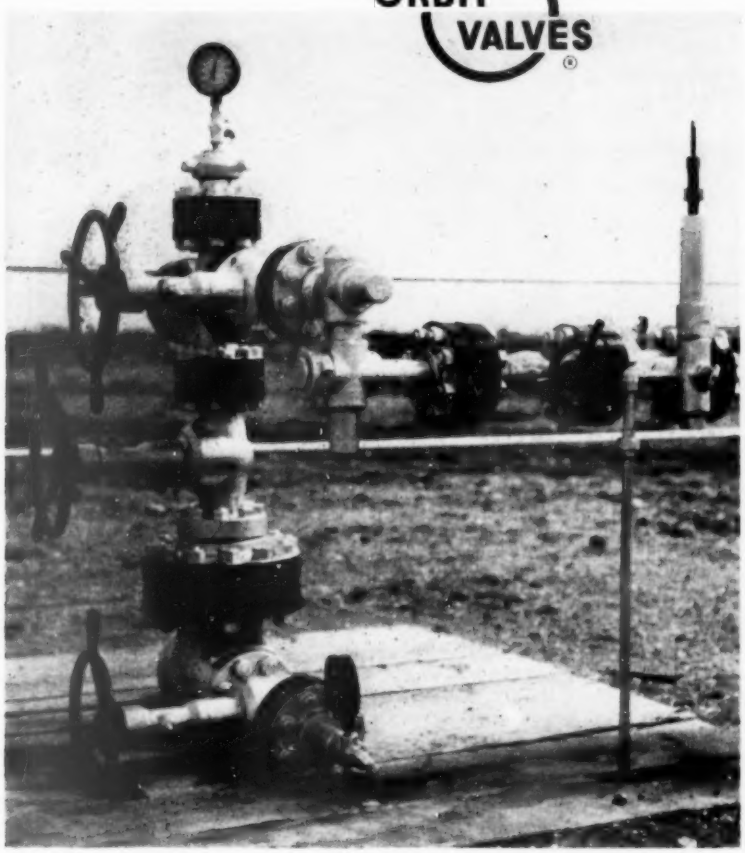

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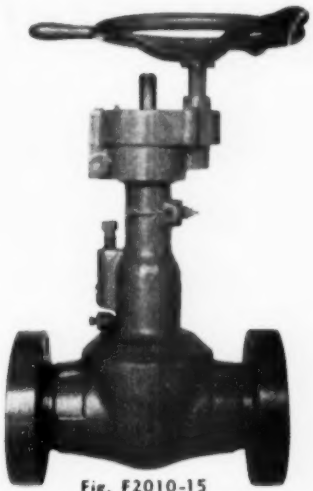

Fig. F2010-15
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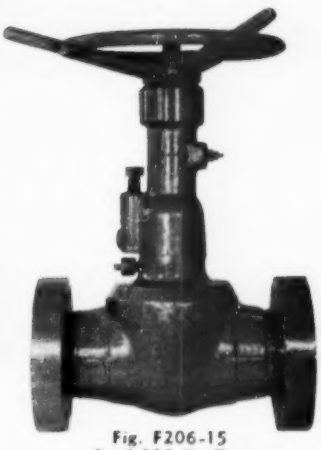

Fig. F206-15
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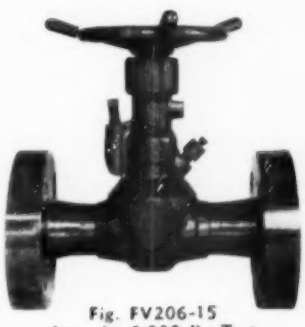

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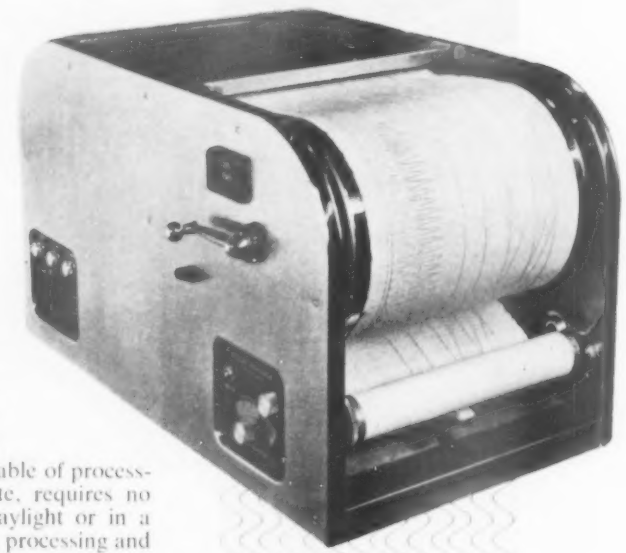

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nificance alongside the rate of growth in demand in determining an oil company's prosperity. But in Europe demand is still heavily restricted by governmental policies, whether conscious or unconscious.

Obsession with the so-called dollar problem is one major reason for these policies. Another is a general feeling that it is unwise to become dependent upon foreign sources of energy, even if considerably cheaper than domestic sources.

A major difference in American and European attitudes toward the consumption of petroleum is the conviction of many Europeans that the private motor car is a luxury, the use of which should be discouraged by high taxation in order to conserve foreign exchange. To the majority of Americans, living as they do in the suburbs, in small towns, or in the country, the private automobile is a necessary component of their high standard of living.

Conclusion

While the net effect of these observations may appear optimistic to some, pessimistic to others, the principal conclusion to be drawn is that the main task of the oil companies in Europe, especially the American ones, continues to be the old one of selling their product—but selling in a different way from the way we ordinarily think of it here. Even in this country, there is a great deal of public relations involved in the selling job; but, in Europe, where effective demand for petroleum is so strongly influenced by government policies, public relations is infinitely more important, and for foreign-owned concerns, infinitely more complicated.

Shell Headquarters Planned

The world-wide Shell organization is planning to build a new London headquarters on a 5-acre site on the south bank of the Thames River.

Shell has a London staff of about 5,500 persons with offices in 20 different buildings, the best known of which is St. Helen's Court. It has served as the company's main London office for the last 40 years.

The new site, on which Shell has negotiated a 199-year lease, is the area where the main buildings were erected for the 1951 Festival of Britain. Shell has not yet drawn up its own architectural plans, but its headquarters will be a part of the London County Council Development plan for the area. This program calls for an executive block some 25 stories high with three additional 11-story wings. The company plans to accommodate all its London staff in the new Shell Center after its completion.

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Short Cut to Correlation Index

by K. A. Harper

THE Bureau of Mines Correlation Index seems to be gaining rapidly as a means of characterizing petroleum stocks with respect to aromaticity. Unfortunately computation of correlation index is somewhat unhandy when using the equation. The tables presented by W. L. Nelson, The Oil and Gas Journal, 52, No. 22, page 229 (October 5, 1953) are one means of simplification. This equation is as follows:

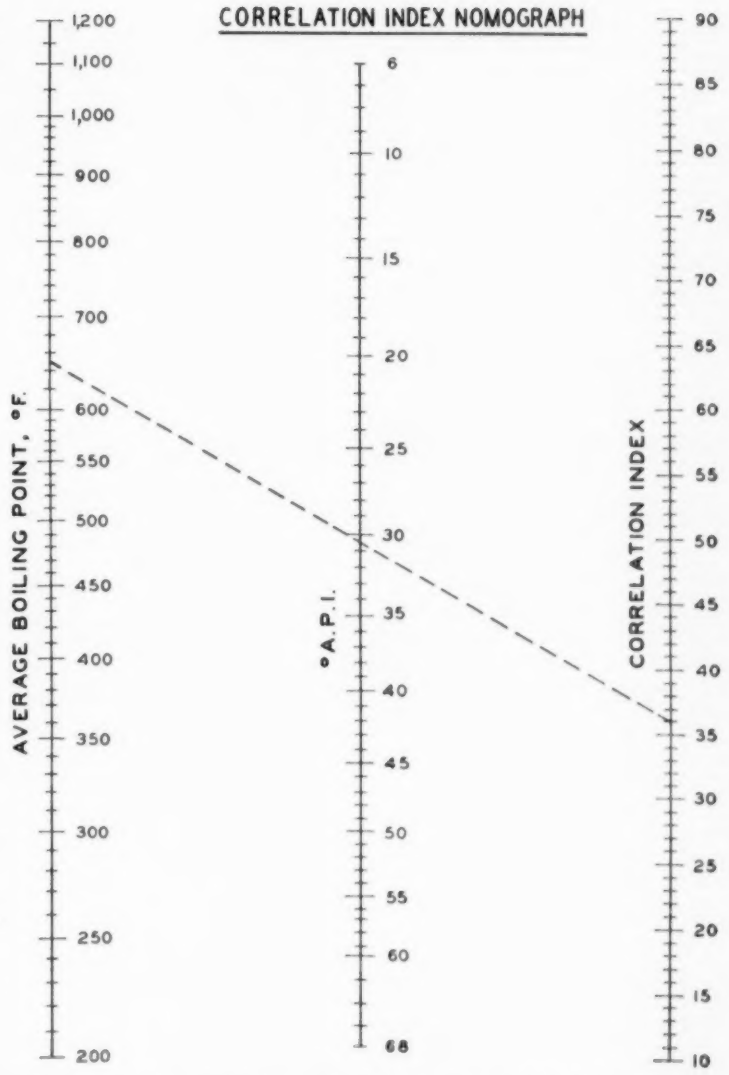
$$C.I. = \frac{48{,}460}{^{\circ}K} + 437.7\ Sp.\ Gr. - 456.8$$

It can also be written:

$$C.I. = \frac{87{,}552}{^{\circ}R} + \frac{67{,}029}{131.5 + A.P.I.} - 456.8$$

The accompanying nomograph has proved to be a valuable time saver for those using the correlation index. An example is shown for 650° b.p. and 30.5° A.P.I. giving 36.0 C. I. The exact calculated value is 35.8. This is typical of the nomograph accuracy. Since 3° error in boiling point or 0.1° A.P.I. would give the same error in correlation index the nomograph is considered satisfactory. It has also been common practice to simplify calculations by using 50 per cent point in place of the average boiling point. No attempt has been made to determine the loss of accuracy due to this short cut. However, if this is done continuously the trends should be consistent.

Author is supervising process engineer in refining department, Phillips Petroleum Co., Bartlesville, Okla.



This nomograph facilitates rapid estimation of the correlation index when characterizing petroleum stocks with respect to aromaticity.

World Output Up

(Continued from page 120)

total, including the Communist countries. It was the first time the share of the United States has dropped below half. In 1946, the ratio of United States output to the total was 63.1. Successive declines brought the figure to 52.2 in 1951 and 50.8 in 1952.

A number of significant and interesting developments lie behind the fact that Free World production showed a net per cent gain in 1953. Venezuelan production dropped, as did output in Mexico. Another sharp increase in Middle East production brought this region's total to a new record high of 2,403,000 bbl. daily, some 635,000 bbl. daily above the average for 1950, the last full year before the loss of Iran's oil to the Western World.

During the year, the trend of production was such that the gains during the first half of the year were considerably greater than during the last 6 months when output showed a tendency to level off. This was particularly true in the United States where the average for the year of 6,455,000 bbl. daily compares with a first-half average of 6,513,000 bbl. daily. Total Free World production during the first half averaged 11,765,000 bbl. daily against the average for the year of 11,775,000 bbl. daily. Output in the Middle East rose to an all-time high in June of 2,536,000 bbl. daily and then dropped back in succeeding months.

Oil production in Western Europe, though still only a fraction of total requirements, showed another gain in 1953. Most of this was due to the continued rise in production in West Germany, the leading oil producer in non-Communist Europe. Production in the Netherlands also gained slightly last year. Schoonebeek field's output has been stabilized, but additional oil is now being produced commercially from the new Rijswijk area on the outskirts of The Hague.

Most of the French production continues to come from the relatively shallow formations in Lacq field in the southwestern part of the country.

In Egypt, production showed a small increase this year, but a dropping off in the near future is anticipated from the existing fields. The two producing companies in Egypt, Anglo-Egyptian Oilfields, Ltd., and Socony-Vacuum Oil Co., Inc., have discontinued all exploration because of the legal situation, but a Swiss-controlled group, International Egyptian Oil Co., this fall began exploratory drilling on concessions in the Sinai Peninsula.

The tremendously productive fields of the Middle East further increased their share of the world total this year. The ratio of Middle East production to the world total, including Communist countries, rose from 16.9 per cent in 1952 to 18.5 per cent in 1953. In 1946, for example, production in the Middle East made up only 9.3 per cent of the world total.

The most spectacular increases in production since the end of the war have been in these fields of the Persian Gulf and northern Iraq. The sharp rise in production in Kuwait was given a further stimulus in 1951 when Anglo-Iranian Oil Co., Ltd., turned particularly to this area to replace what it formerly had produced in Iran.

The partially estimated figures for 1953 shows Kuwait's average for the year to be slightly higher than Saudi Arabia. During the year, month-to-month production reports showed these two countries running neck-and-neck for the position of No. 1 oil country of the Middle East and the fourth leading oil producer of the world after the United States, Venezuela, and Russia. In October, Kuwait's production rose to an all-time high of 950,300 bbl. daily. This set a new record not only for the Middle East but also as the largest output ever achieved by a single oil company.

Saudi Arabia's production increases for the last several years have been much less than those in Kuwait. The shutdown in Iran shifted some additional demand on to Saudia Arabia, but all along, it had been recognized that this dollar-produced crude would encounter competitive disadvantage against the sterling production of Iraq and Kuwait in certain markets of the Eastern Hemisphere, and a leveling off in output was anticipated.

The largest single percentage gain of any major oil company in 1953 was made by Iraq where output was up 48 per cent. This reflected the first full year of operation of the 30 and 32-in. line providing a new Eastern Mediterranean outlet for Kirkuk field which has been producing 490,000 - 500,000 bbl. daily. A new 24-in. line was completed this fall from Zubair field in southern Iraq to Fao.

The production shown for Iran represents net output less recycled products. Gross production by National Iranian Oil Co. amounts to around twice this total, and the difference has been returned to the producing formations.

Some additional crude is being obtained by Assam Oil Co., Ltd., in India from the Nahorkatiya discovery. Output of Burma's fields was stepped up as a result of the refinery expansion at Chauk; about 2,800 bbl. daily is being produced by Chauk and Langwa.

The 1,040,000 bbl. daily now credited to the U.S.S.R. is the total which has been disclosed by Soviet leaders.

World's Reserves

(Continued from page 119)

and development had been suspended.

The total reserves credited to Saudi Arabia are only slightly less than the proved aggregate of the entire United States. The figure now shown—some 10 billion barrels above that given last year—agrees generally with many estimates in the industry. The increase is due to further development and definition of Greater Ghawar field, a single reservoir more than 70 miles long comprising the formerly separate producing areas of Shedgum, Ain Dar, and Uthmaniyah. This field is by far larger than Abqaiq, once the mainstay of Saudi Arabian production.

Saudi Arabian reserves are regarded as considerably greater than those of Kuwait, whose Burgan field has been considered as the world's largest. Kuwait Oil Co., Ltd., has opened up its Magwa area north of Burgan to production, but the recent Ahmadi Ridge discovery is not yet developed. The higher reserves attributed to Iraq are the result of continued development of Zubair field in southern Iraq. The discovery of deeper Cretaceous production in Kirkuk and the recent Rumaila discovery west of Zubair both are still somewhat in the class of unknown quantities.

The 80-million-barrel total for Turkey is generally in line with statements of the government whose M.T.A. Institute controls the two fields in southeastern part of the country, and the figure is supported by foreign geologists who are familiar with the development carried out. The Neutral Zone appears in the reserves column of the Middle East this year for the first time. The 300 million barrels shown are for Wafra field, discovered last spring and still in the initial development stage. Iran's estimated 15-billion-barrel crude reserves remained "locked up" with no settlement of the nationalization dispute, and its production-reserves ratio is a fantastically high 1,465.

The estimates shown for the Communist-controlled countries, including the U.S.S.R., are little more than guesses made against the background of previous information. Russian Government statements have claimed reserves for the Soviet Union of 4½ billion tons, or around 32 billion barrels, but western oil men believe a much lower total is correct. Austria's reserves have been built up by an intensive Russian exploration and development program since the end of the war, and some estimates run higher than the 200-million-barrel figure given.

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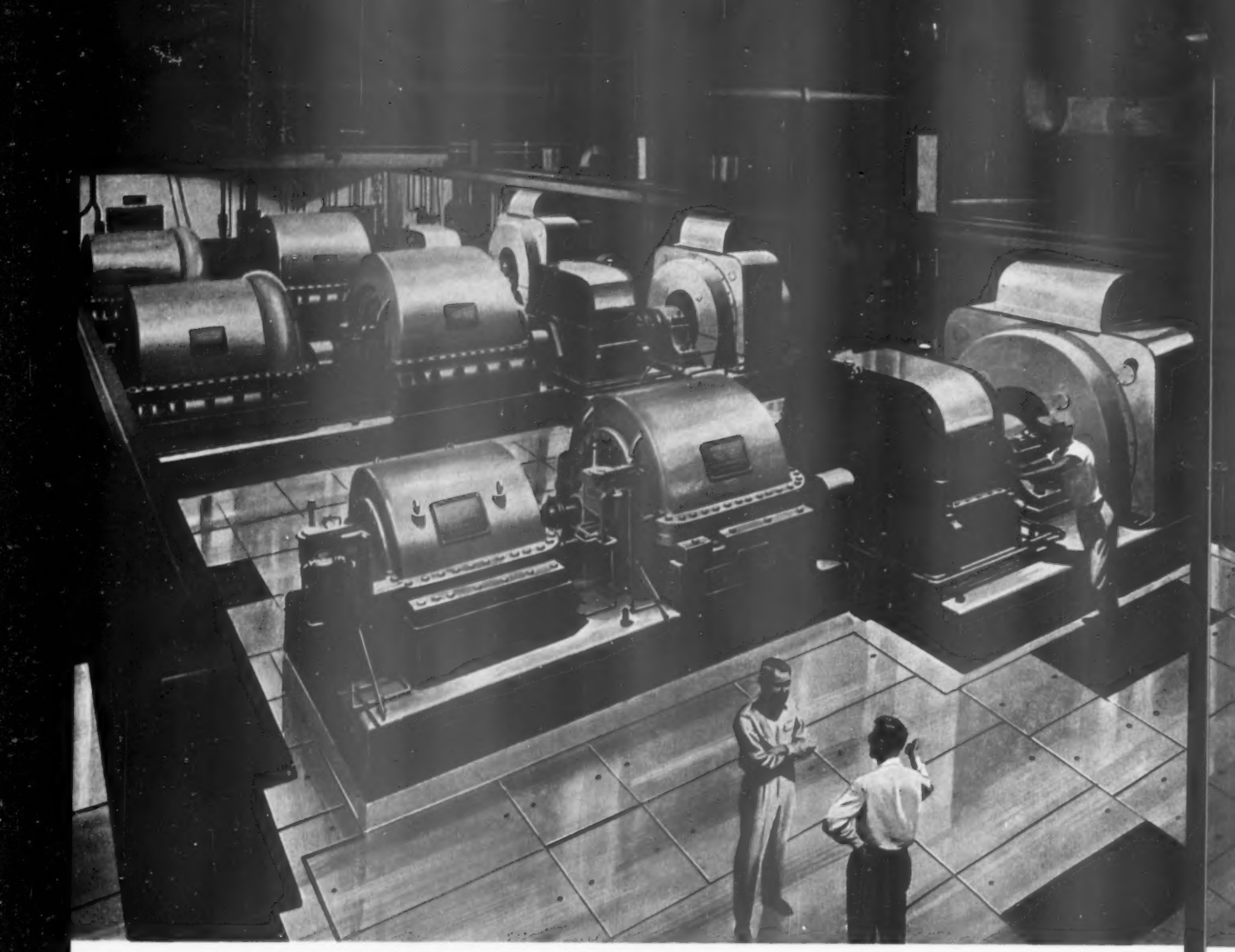

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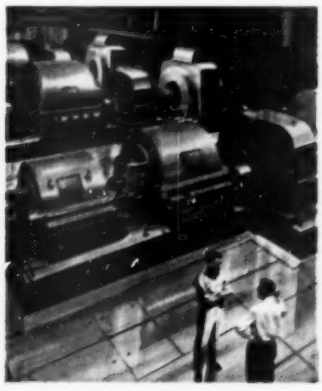

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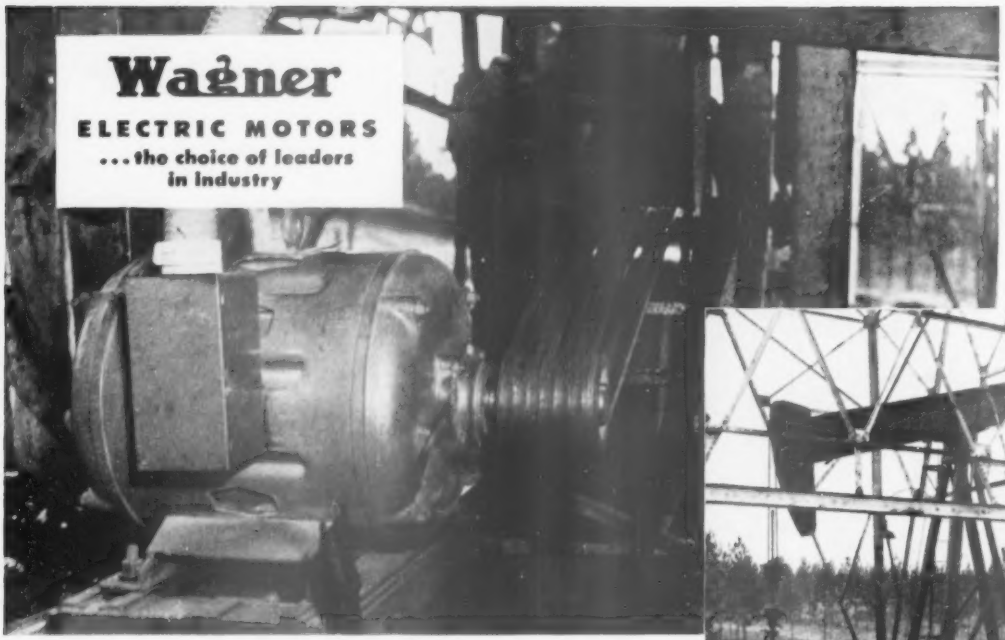

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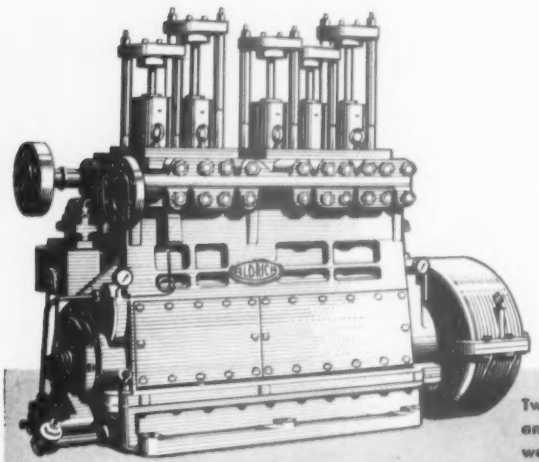

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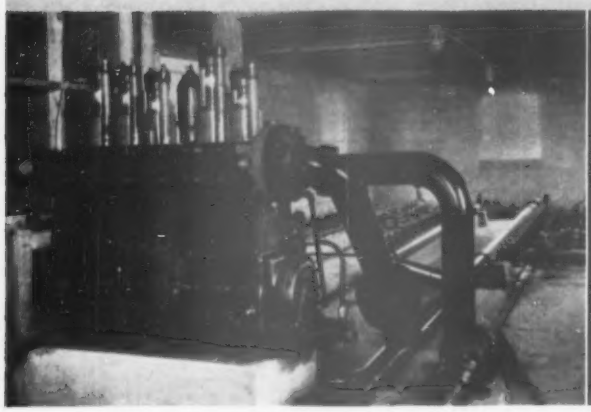

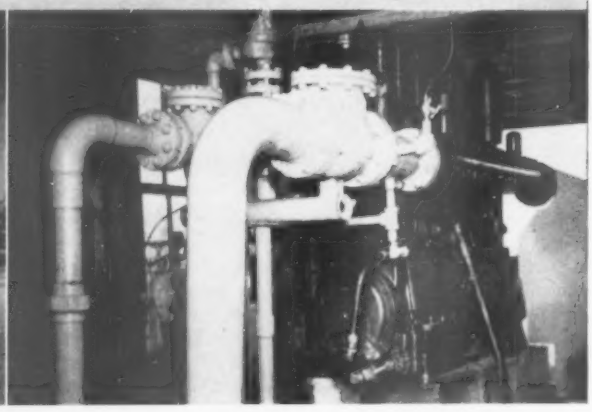

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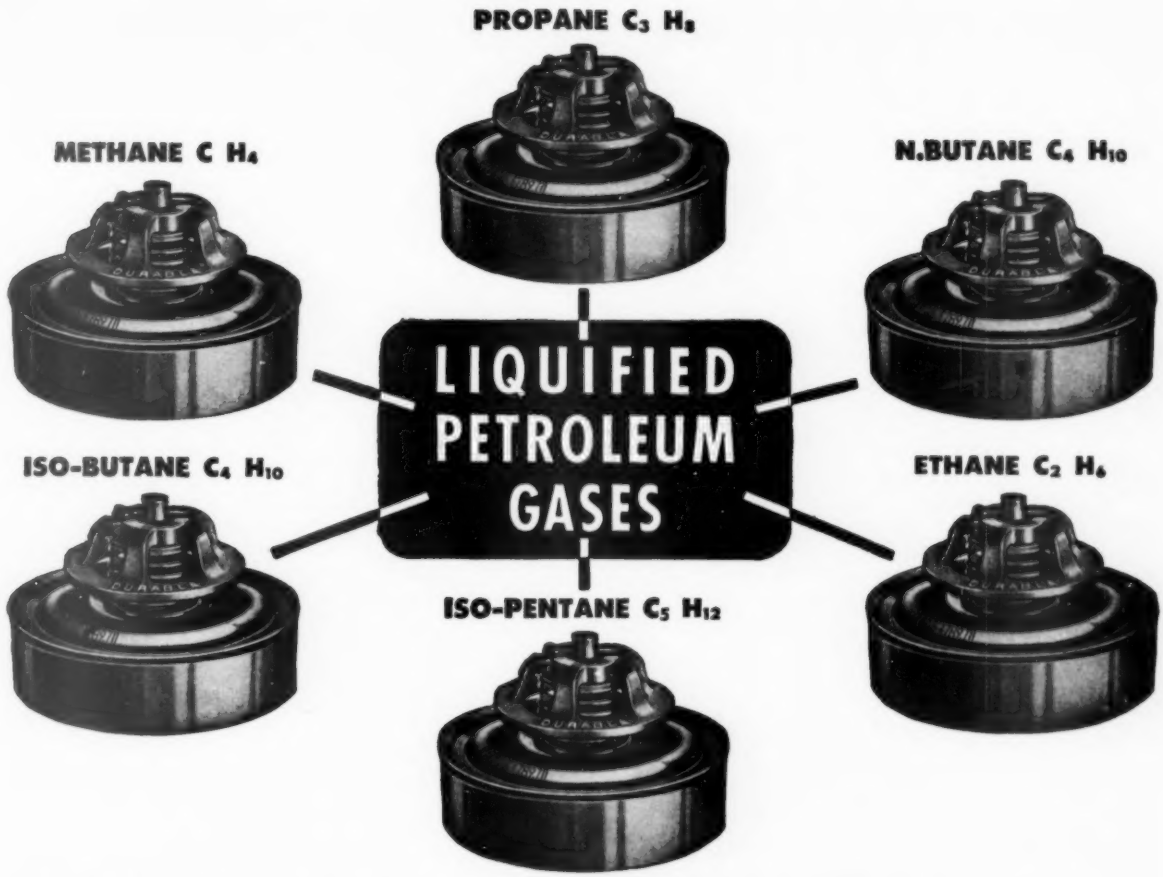

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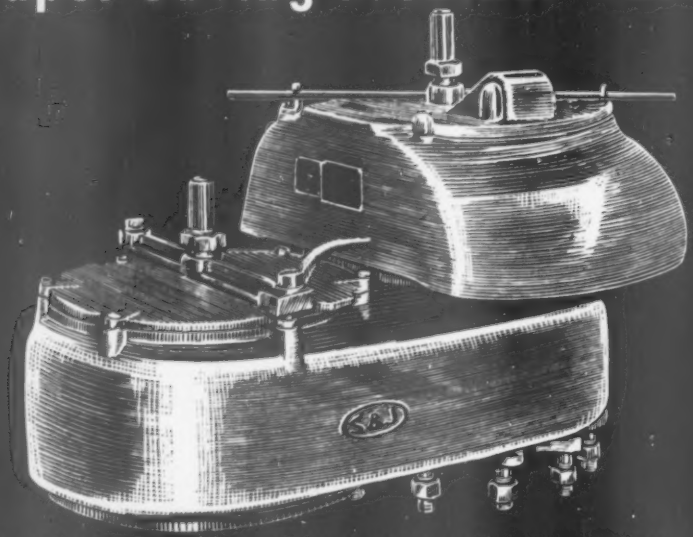

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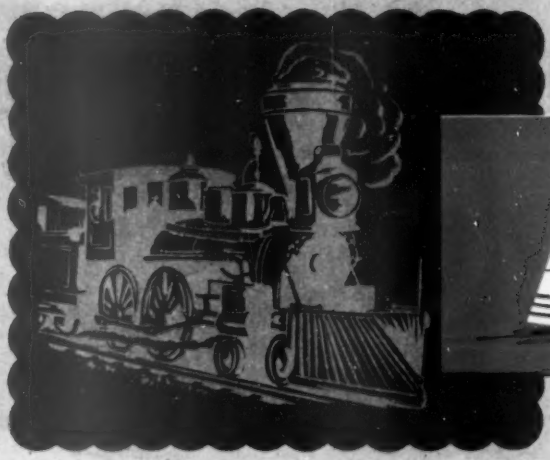

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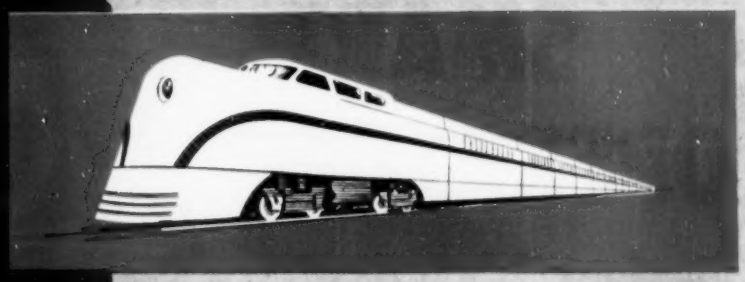

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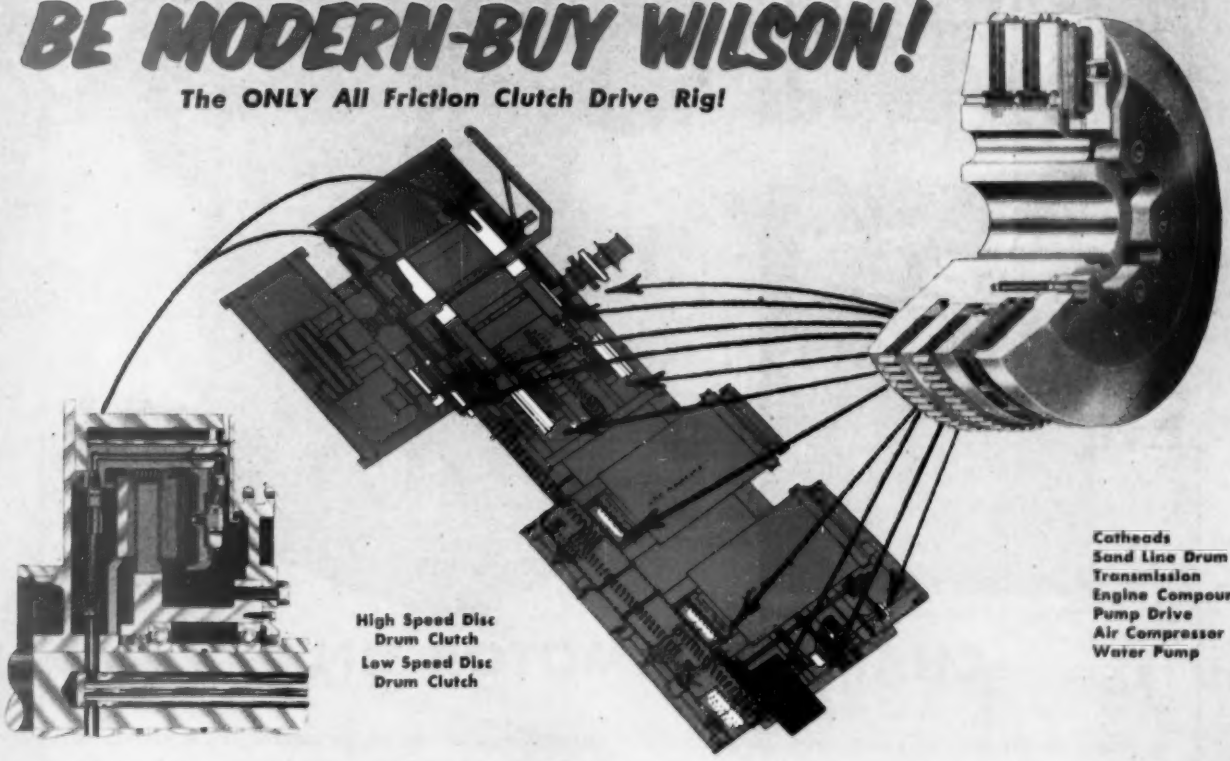

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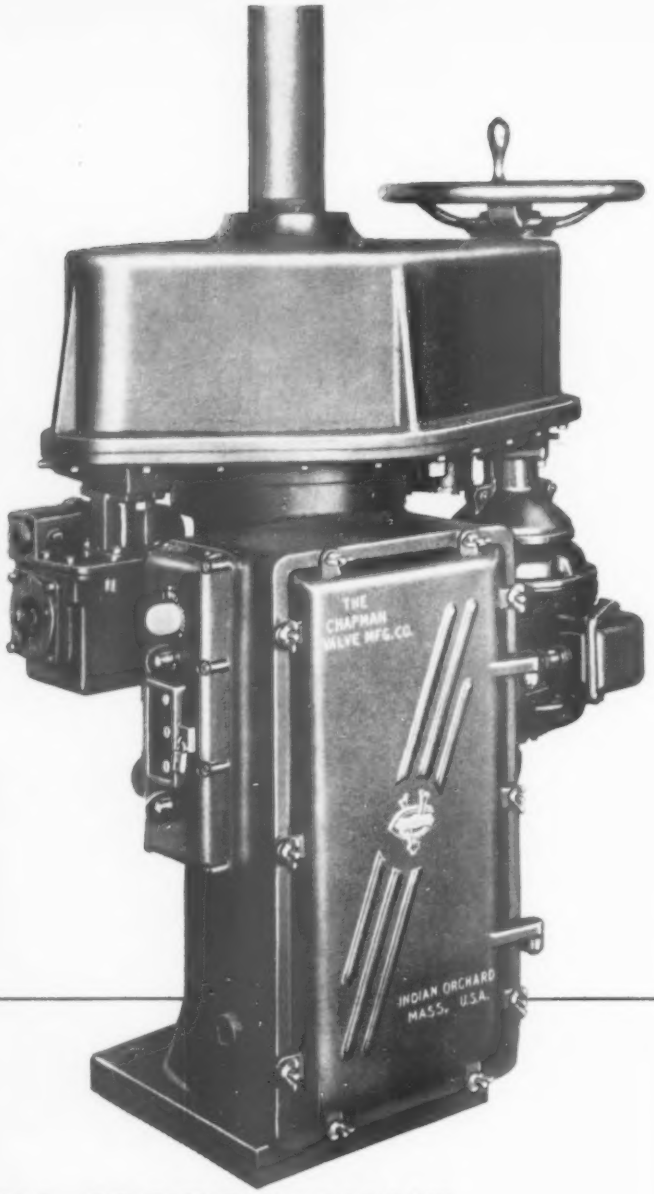

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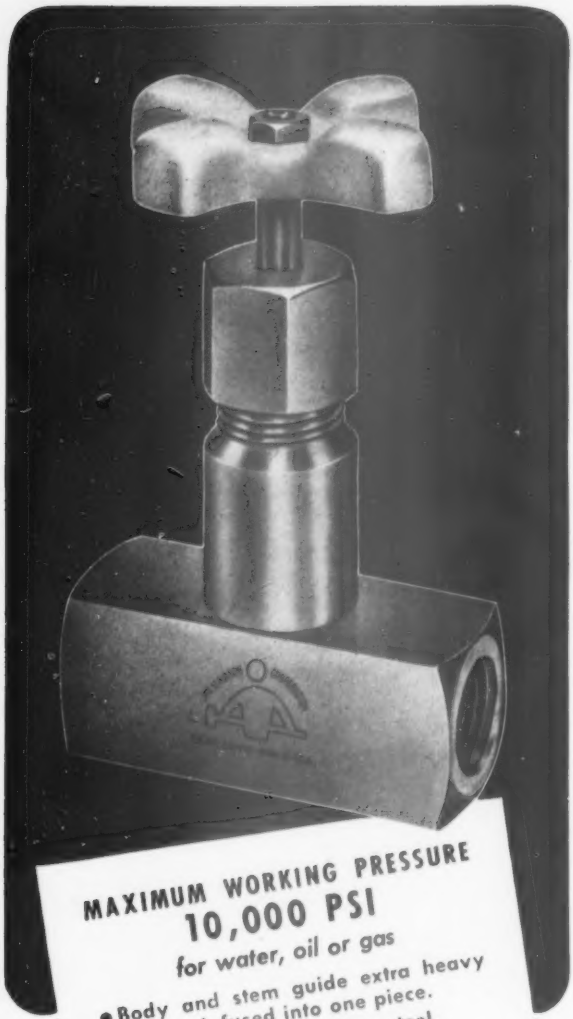
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York

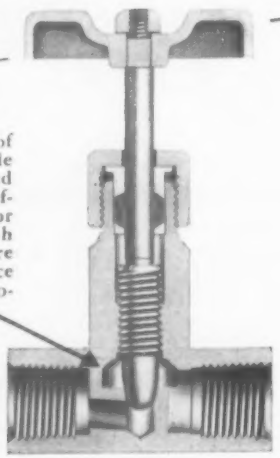


MAXIMUM WORKING PRESSURE
10,000 PSI
for water, oil or gas

- Body and stem guide extra heavy bar stock fused into one piece.
- Valve stem 416 stainless steel.
- Packing special one-piece "Marpak" moulded ring.
- Bodies marked in accordance with MSS regulations.

ONE PIECE

The stem guides of conventional needle valves are screwed into bodies—this often causes leakage or blow-outs. Marsh Needle Valves are fused into one-piece by exclusive "Conoweld" process.



Introducing-

The Ultimate in Needle Valves

Here is one of the crowning achievements of Marsh research, design, and manufacturing skill. It is the first needle throttling and shutoff valve to combine *all* of the qualities called for today in this highly critical and ever broadening field.

It is a valve that has strength and safety to spare . . . rated for pressures up to 10,000 psi—equally efficient in the lower ranges. A product of Marsh instrument-making and valve manufacturing experience, it combines instrument-like precision with the ruggedness that distinguishes all Marsh valve specialties.

The illustrations tell the story of new thinking; new standards. Body and stem-guide are machined from extra-heavy carbon steel bar stock. Still greater strength and rigidity are achieved by fusing the stem-guide into the body. The complete fusion of guide and body is accomplished by the exclusive Marsh "Conoweld" process.

There are two big advantages to this one-piece construction: (1) It eliminates the danger of unscrewing the valve from the body when opening—a frequent cause of leakage, even dangerous blow-outs (2) It permits perfect line-up of threads and seat. As a result, Marsh valves are easier to operate even at high pressures.

The precision-machined stem is 416 stainless steel. Stem threads are fine pitch for extra strength and fine, controlled regulation. Notable advancements are special "Marpak" one-piece, non-binding longer-lasting packing; deep thread chambers, keeping inlet and outlet piping away from ports and contributing excellent flow characteristics. Entire packing nut and packing gland are electro-zinc plated, preventing corrosion and giving the valve a handsome, plated exterior. The rugged malleable handle is finished in heavy baked enamel.

The new needle valve line includes globe and angle patterns with double female connections in sizes ⅛", ¼", ⅜", ½", ¾" and 1". Also globe and angle valves with male inlet and female outlet in sizes ¼" and ½". *Complete stock carried at our Skokie, Illinois factory and also at our branch plant in Houston, Texas.*

Write today for catalog giving complete details.

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Unless you get *both*, you aren't getting your dehydrating dollar's worth. The Tretolite Company provides both.

Having pioneered chemical dehydrating, Tretolite can offer manufacturing experience and service know-how without equal.

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VALVES, FITTINGS and FLANGES

by

Vogt

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This 24 acre Vogt plant supplies the most comprehensive line of top quality *drop forged* steel piping materials anywhere available to industry. That's why they're the choice of leading refineries, power plants, chemical plants, etc., the world around!

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Flanged, Screwed and Socket Weld End Globe, Gate and Check Valves • Ells, Tees and Crosses • Couplings • Bushings • Plugs • Unions • Flanges and Flange Unions • Welding Heads

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Branch Offices: New York, Philadelphia, Chicago, Cleveland, St. Louis, Dallas, Charleston, W. Va.

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NEW 1954 CHEVROLET TRUCKS

Completely new—the most powerful, finest performing, best-looking Advance-Design trucks ever built!

Here's America's greatest truck builder's latest and greatest truck! Here's the brand-new line of Chevrolet Advance-Design trucks for 1954!

You'll find they're packed with great new features . . . loaded with big new advantages that mean faster, more efficient service and lower operating costs on *your* job.

NEW POWER AND ECONOMY

You get new high-compression power and greater operating economy with *three* advanced valve-in-head engines. Bigger, brawnier "Thriftmaster 235" engine. Rugged, durable "Loadmaster 235" engine. Mighty, all-new "Jobmaster 261" engine*—most powerful in Chevrolet truck history.

NEW RUGGEDNESS AND RELIABILITY

Heavier axle shafts on 2-ton models. Bigger, more durable clutches on light- and heavy-duty models. Stronger, more rigid frames on *all* models. New pickup and stake bodies are built to stand the roughest going and to keep coming back for more—and they give you greater load space for '54!

NEW COMFORT AND CONVENIENCE

New Comfortmaster cab provides increased visibility with new one-piece curved windshield. New Ride Control Seat* brings you extra driver comfort. New truck Hydra-Matic transmission* offers the last word in no-shift driving ease. Available not only on ½- and ¼-ton Chevrolet trucks, but on 1-ton models, too!

Plan to see the completely new '54 Chevrolet trucks, and get the whole money-saving story at your Chevrolet dealer's now. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**Optional at extra cost. Ride Control Seat is standard on C.O.E. models, available on all other cab models as extra equipment. Rear corner windows in standard cab, optional at extra cost.*

Most trustworthy trucks on any job!

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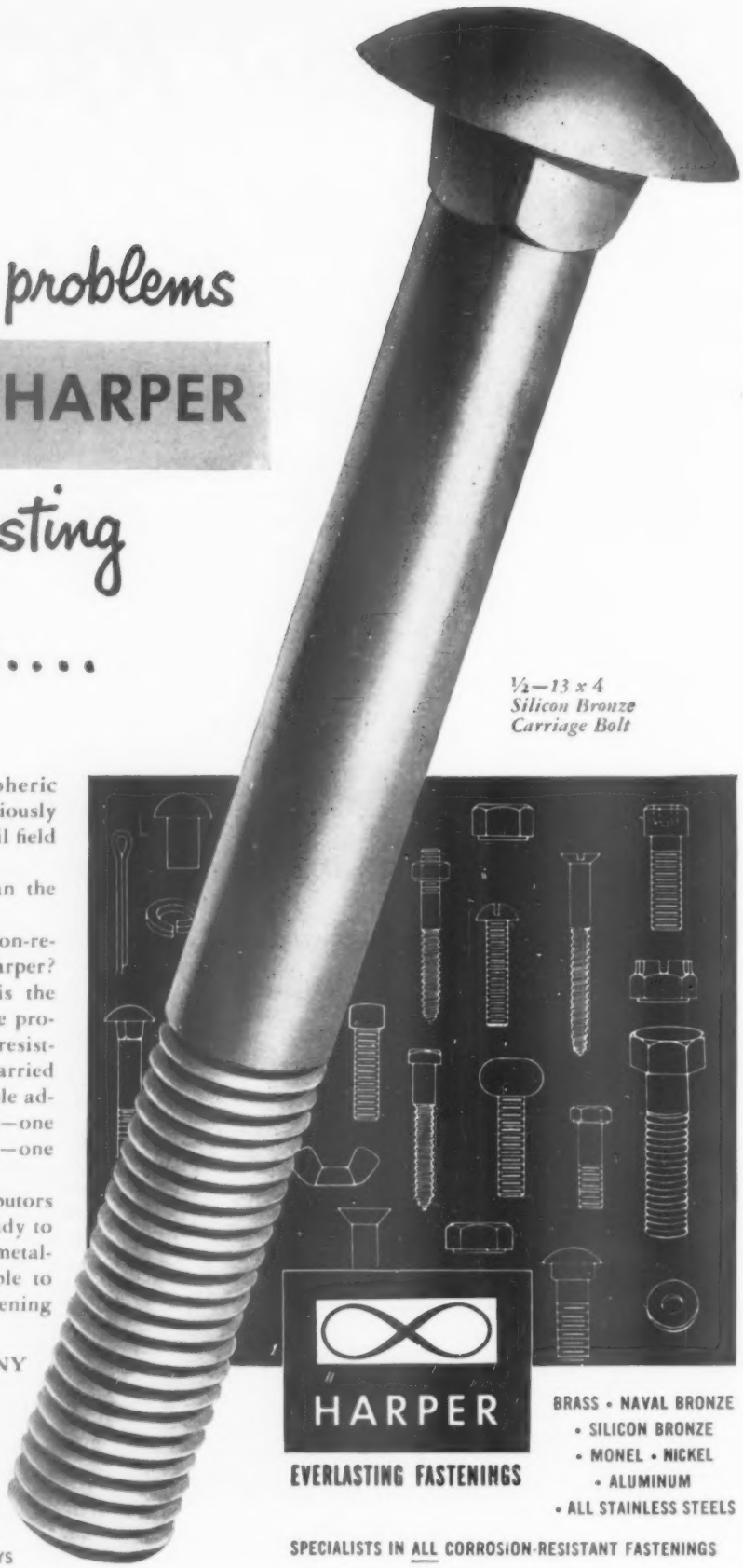
ADVANCE-DESIGN TRUCKS

MORE CHEVROLET TRUCKS IN USE THAN ANY OTHER MAKE

tough corrosion problems solved with HARPER everlasting fastenings....



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Sour crudes—salt spray—atmospheric conditions—corrosive acids—all seriously affect the life of equipment in the oil field or refinery.

Any equipment is no better than the fastenings used in its construction.

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The H. M. Harper Company is the world's largest and oldest exclusive producer of fastenings from corrosion-resistant metals. Over 7,000 items are carried in stock, bringing to you the multiple advantages of a single source of supply—one order to write—one account to keep—one bill to pay.

Harper branch offices and distributors are located in all market areas, ready to give you prompt service. Harper metallurgists and engineers are available to work with you on any tough fastening problem.

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- "Crack that Valve" and not the formation by using the Johnston Hydraulic Tester.

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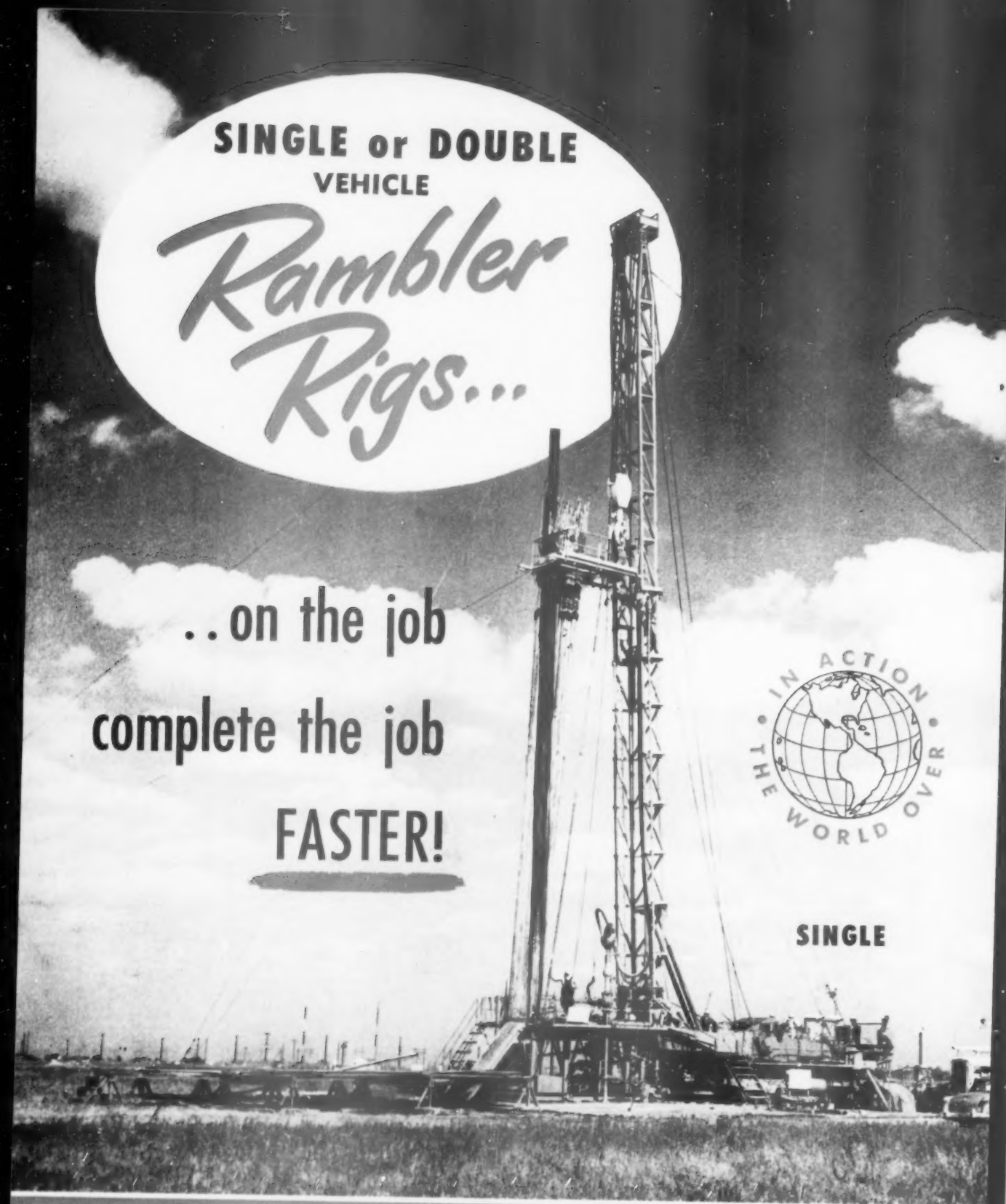

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IDECO Hydrair 35 Rambler Rig with 103 ft. IDECO Kwik-Lift Mast working over a deep well for a major company.

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FOR EVERY DEPTH

One rig does three jobs: drilling, service, and work-over

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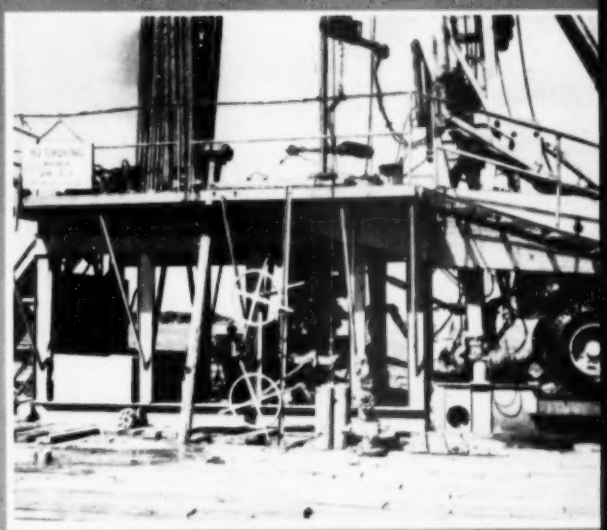
Rambler Rigs move onto location rigged up ready to operate.

RAMBLER RIGS are field proved . . . faster . . . more economical . . . in action the world over.

Single truck or trailer mounted Rambler Rigs combine the IDECO Hydrair Hoist with its power plant and the IDECO Kwik-Lift Mast . . . transported rigged up . . . ready to operate in minutes after moving on location. The new double vehicle Rambler carries the drilling rig on one vehicle and mast on another . . . reducing the loads on each vehicle.

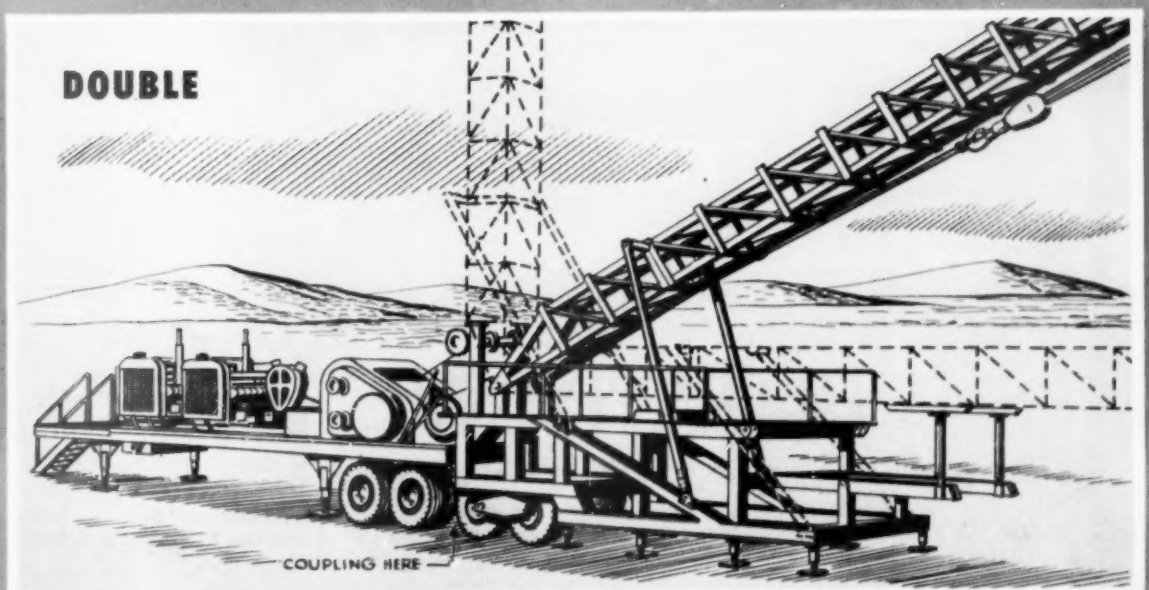
Rambler Rigs are available with drawworks powered by engines of 150 to 525 horsepower, and with masts from 65 to 103 ft. in height.

For additional information on the many Rambler Rig sizes, capacities, and horsepower combinations, write IDECO, Atlantic Bldg., Dallas, Texas.



Substructures are available from heights of 6'6" to 9'2" and with capacities from 100,000 to 400,000 pounds.

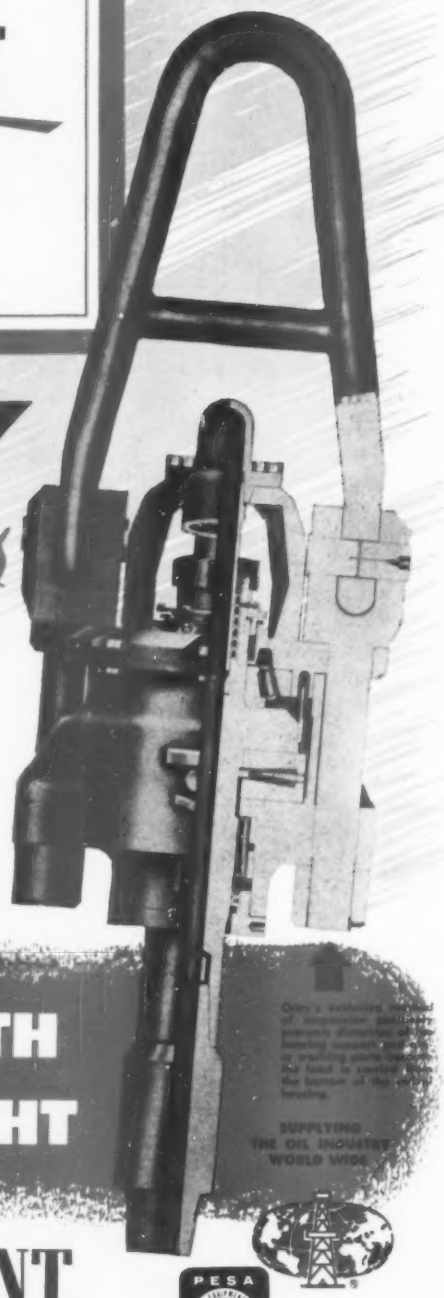
DOUBLE



The "Double Rambler" 2-vehicle rig has been developed by IDECO to fill the long-felt need for *larger, portable, multiple-purpose rigs.*

MID-CONTINENT *Appointed* DISTRIBUTOR

GRAY *Rotary Swivels*



Gray Tool Company of Houston has announced the appointment of Mid-Continent Supply Company as a fully authorized distributor for Gray Swivels and Swivel Parts in the United States and Canada.

Complete Stocks of Gray Swivels and Swivel Parts are available at all Mid-Continent Supply Company stores in the United States and Canada—"Wherever There Is Oil!"

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THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

CHEMICAL PROCESS NEWS

PUBLISHED BY CHEMICAL PROCESS DIVISION, THE M. W. KELLOGG COMPANY — DECEMBER 1953

NOTES ON AMMONIA

The cost of a plant for the production of synthetic ammonia is greatly affected by the composition of the feed gas.

* * *

Conventionally, if natural gas is the feed it must undergo several preparatory steps to produce a suitable mixture for the ammonia synthesis. Reforming or partial combustion must be followed with CO shift and then absorption purification to remove CO_2 and unconverted CO. On the other hand, if hydrogen-rich gas is the charge the process requirements are greatly simplified. The feed is chilled to low temperature and subjected to liquid nitrogen washing to remove impurities. Ammonia synthesis is accomplished by the same method with either feed stock.

* * *

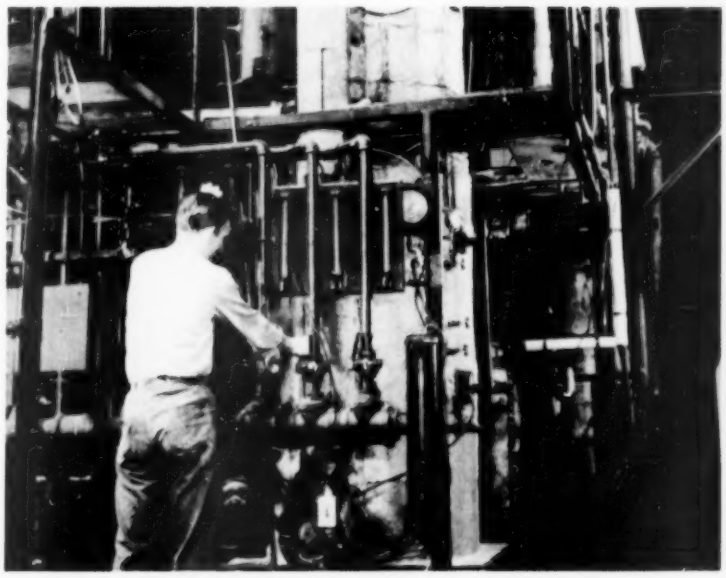
Since the largest single item of cost in the production of ammonia is the charge for plant depreciation, (about 20% greater than per-ton-direct-operating-cost in a natural gas feed plant) the extent of the equipment required to prepare synthesis gas has a major effect on total production cost.

* * *

Economic analyses of processes involving both feeds show that the payout time for plant utilizing hydrogen-rich gas is in the neighborhood of three years, and that employing natural gas is less than five years.

* * *

Thus there is a great economic incentive for anyone with hydrogen-rich gas or by-product hydrogen available to enter the fields of ammonia production.



Ethylene Pilot Plant Studies Disclose Flexibility of Unique Pyrolysis Method

In the pilot plant shown in the illustration Kellogg is currently carrying on extensive studies of the adaptability of its unique pyrolysis process to the production of high purity ethylene from feed stocks other than naphtha—the charge stock for which the process was originally developed.

The pilot plant runs have already proved that the method can be employed successfully on ethane, propane and heavier materials without production of the large amounts of coke normally encountered in conventional processes.

This low coke production had been predicted on the basis of commercial operating reports from an ethylene plant which Kellogg designed and erected in England for the pyrolysis of naphtha.

Whereas conventional pyrolysis furnaces usually average only a few weeks on stream before being shut down for coke removal, the English plant has remained in continuous operation for 12-month periods. During these times it was operated with sufficient severity to convert 55 to 60 wt.% of the naphtha to ethylene and other gaseous hydrocarbons.

The unique fractionation system of the English plant has also proved highly efficient as demonstrated by the fact that the plant produces 99.9% pure ethylene.

In addition to producing high quality products over extended periods, the plant has attained maximum economy of the heat required for pyrolysis. A novel design in the quenching system which follows the pyrolysis step, plus the use of low-level heat by the absorption refrigeration system, provide major savings through recovering most of the heat used in cracking.

Technician in Kellogg's Analytical Laboratories determines olefin yields from pyrolysis pilot plant run.

(SEE REVERSE SIDE)

CONTINUED FROM PRECEDING PAGE

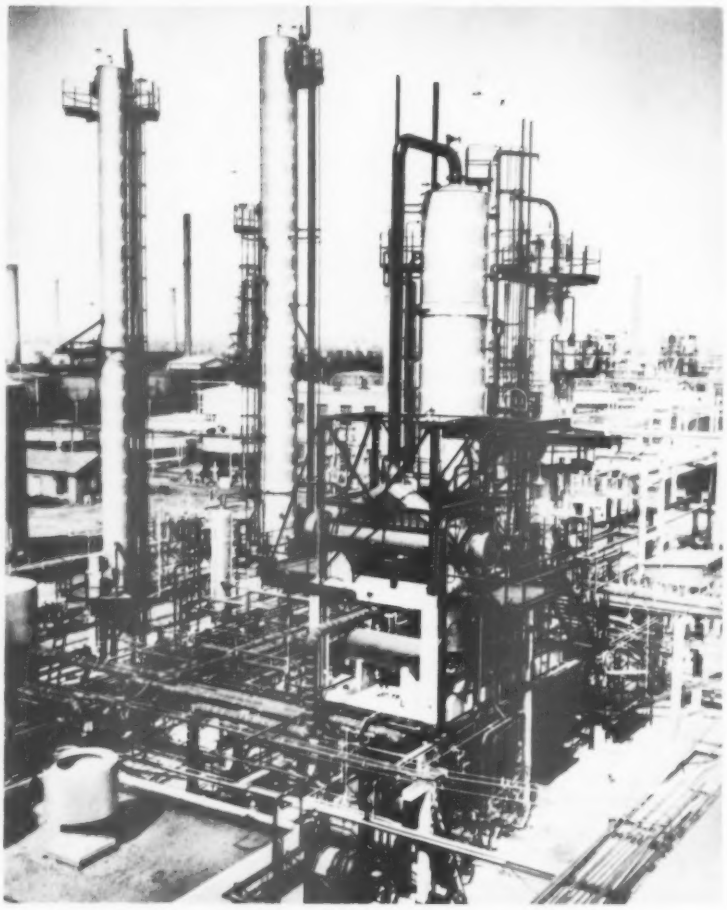
Work Well Underway On Fluid Phthalic Plant in England

Work is well underway on a Fluid phthalic anhydride plant now under construction in England. It is scheduled for completion by the Spring of 1954.

Several design improvements have been developed since the first such plant was built in the U. S. and they are being incorporated in the new plant.

Most important is the re-design of the condensing system which not only decreases capital investment but also improves operating conditions. It precludes, for example, any need for operators to come in direct contact with the phthalic or its fumes.

A second unit is also being built, this one on the Continent. Between the two they will produce about 50 million pounds of phthalic anhydride annually. The product in this process is produced by the oxidation of naphthalene in the presence of a fluidized solid catalyst.



NEW ALCOHOL PLANT . . . is well on the way toward completion in the Mid-West. Employing the basic OXO process, it will produce iso-octyl alcohol. This view was taken looking northeast over the east end of the control room to the main fractionating tower group. Shown in the background are alcohol, alcohol re-run and aldehyde columns.

Two New Process Bulletins Issued

"Make high quality urea with lower initial investment, decreased operating investment, operating costs . . ."

Bulletin describes advantages of new Montecatini "Ammonia-Saturated" Urea Process now licensed exclusively in the United States by The M. W. Kellogg Company.

"High yields low operating cost through ammonia plants . . ."

Investments for ammonia plants employing either natural or hydrogen-rich gas are shown in convenient form, as are utilities and other operating costs.

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Typical Current Kellogg Chemical Plant Contracts in the fields of—

- ★ Ethylene
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For further information, technical data, etc., relating to chemical or petrochemical processing, write

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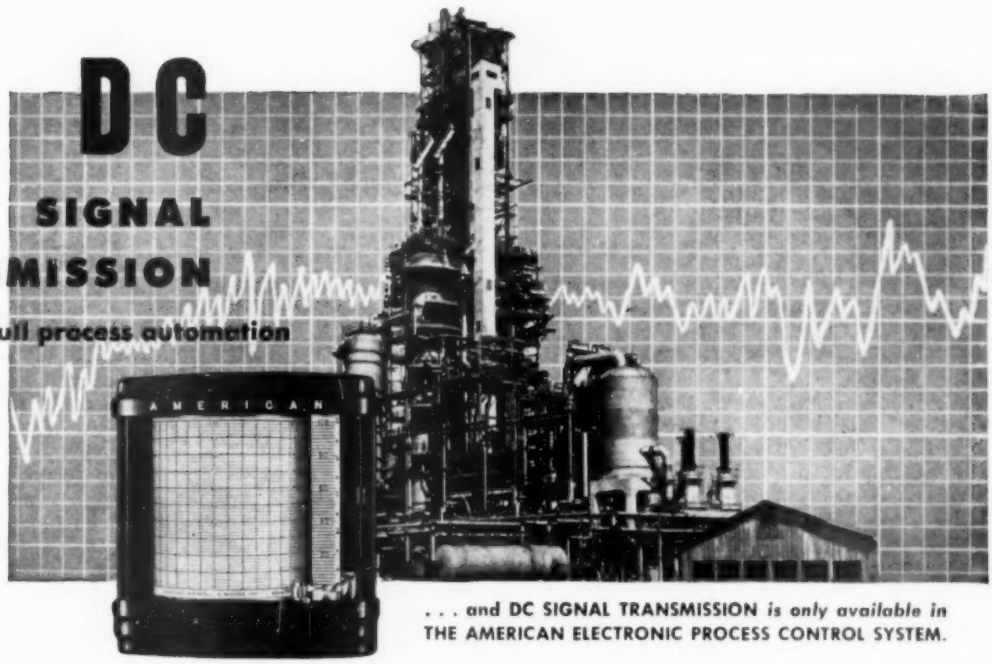
DC SIGNAL TRANSMISSION

the key to full process automation



. . . and DC SIGNAL TRANSMISSION *is only available in* THE AMERICAN ELECTRONIC PROCESS CONTROL SYSTEM.

Most modern electronic print-out, monitoring and computing equipment is designed for DC operation. Until recently it was impractical to integrate these automatic devices with instruments that measure process variables. Consequently, complete process automation was impossible.

Now—the new American Electronic Process Control System provides the major compatability factor essential to achieve the economic advantages of full process automation: *DC signal transmission.*

The instantaneous DC transmission of process variable measurements permits higher controller gains that result in a new concept of control performance. At the same time, it makes possible the efficient "electric nerve center" so essential to the low-cost operation of the ultra modern plant of today and the standard plant of the future. In short, the American Electronic Process Control System provides the only practical foundation for integration of . . .

1. **AUTOMATIC LOGGING** — the continual listing of operational data in tabulated digital form.
2. **AUTOMATIC MONITORING** — the centralized supervision of all measured criteria for maximum safety and efficiency.
3. **AUTOMATIC COMPUTING** — for precise accounting and engineering analysis at highest speed and lowest cost. Ushers in the fully automatic plant with completely automatic product analysis and control.

In addition to this unique versatility, the American Electronic Process Control System offers *improved quality of control*—tighter control that opens the way for a reduction in the size of process equipment and consequently a lower capital investment for a given through-put. Furthermore — *simplified communication* — with two-wire DC signal transmission lines that are unaffected by induced alternating currents and varying line resistance, the cost and complexity of present systems will be vastly reduced.

When you select process control equipment, basic considerations are performance, initial installed cost, reliability, maintenance, and flexibility. The advanced design and operation of all instruments in the American Electronic Process Control System assure complete satisfaction on every count. Convince yourself. *Write for Catalog No. 164.*

AMERICAN INDUSTRIAL INSTRUMENTS

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

DOW CORNING
SILICONES

cut motor inventory costs

It has been repeatedly proved that you increase the life and reliability of hard working motors by a factor of 10 or more when you have them rebuilt with silicone (Class H) insulation or buy new Class H machines. That means that you can also reduce the amount of capital you have tied-up in replacement motors.

Here's a typical example. In one department of a metal working plant, 18 spare motors were kept in stock to replace motors on 20 turret lathes that failed at the rate of 1 a month. When those motors were rewound with Class H materials, the number of replacement motors was cut 72%; could be reduced still further because there have been no motor failures in more than 2 years.

And, in this period of transition to new NEMA frame sizes, Class H is performing a special service. The men responsible for the operation of 14,000 motors in a large plant are having stock motors rated at 2 hp at 850 rpm and 3 hp at 1150 rpm rewound with Class H to deliver 5 hp at 1750 rpm. That covers a shortage of 5 hp motors in inventory; costs 40% less than new motors that would be outmoded by the new NEMA standards.

Any way you look at it, money invested in silicone (Class H) insulation pays handsome dividends in lower maintenance costs, more continuous production, greater capacity, lower motor inventory costs. And now is the time to capitalize on it.

mail this coupon today

Dow Corning Corporation
Dept DS-12 Midland, Michigan

Please send me:

- ☐ Performance Data on Class H Machines.
- ☐ List of Class H motor repair shops.
- ☐ Data on Silicone Grease for motor bearings.
- ☐ 24 page booklet entitled "Tall Tales and Fabulous Facts."

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You can also reduce to a minimum motor outages due to bearing failure by using Dow Corning 44 Grease

In open and single shielded bearings designed for high temperature operation, Dow Corning 44 has 8 to 10 times the life expectancy of conventional greases. It gives life-time lubrication in permanently sealed bearings.

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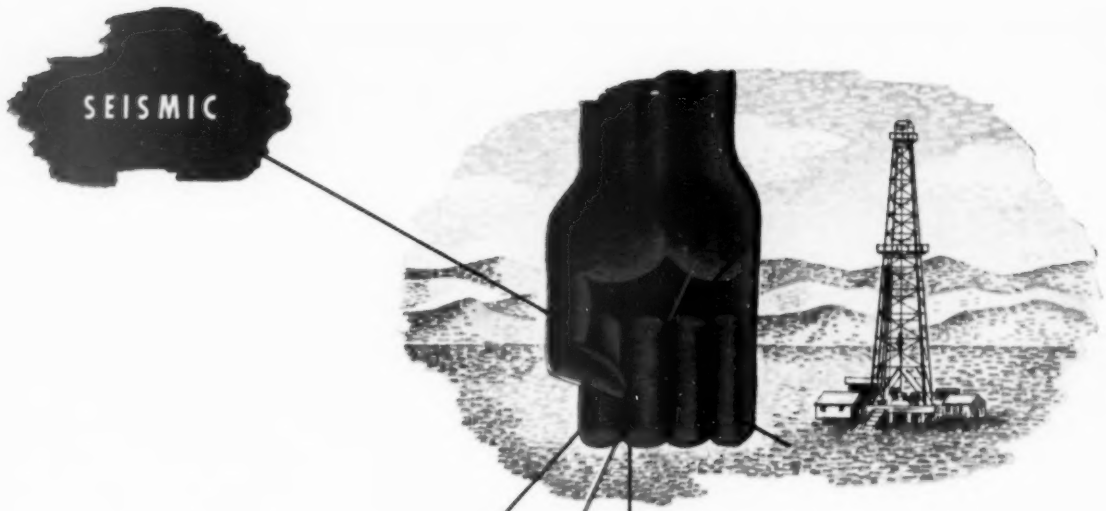

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SEISMIC • GRAVITY • MAGNETIC SURVEYS

"Tube up and forget it" with leakproof Parker *Triple-lok* Fittings

Cramped and crowded, nobody likes to do this kind of a job over again. That's why trouble-free Parker *Triple-lok* fittings were used. Since this hydraulic test stand was completed, it has run over a billion impulse cycles at 3000 psi. without a single leak at any *Triple-lok* fitting.

These flare fittings are absolutely leakproof even under the severest conditions of vibration, high pressures and temperatures. Thousands of destruction tests prove that they will hold pressures that burst the tubing. And, they remain leakproof no matter how often you reassemble them!

Using *Triple-lok* fittings is also the easiest and fastest way to tube up your system even in close quarters. Flared tubing simplifies installation. For fitting make-up, you need only a small wrench because assembly torque is so low.

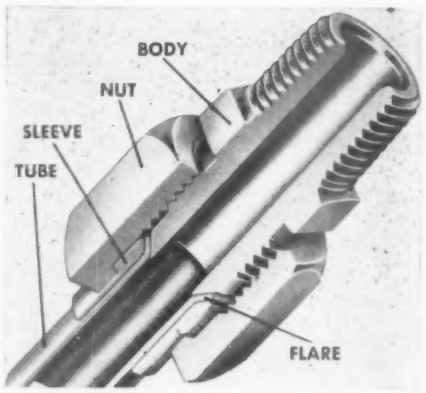
These fittings meet J.I.C. and S.A.E. standards plus specifications of the A.S.M.E. Code for Pressure Piping.

As a matter of fact, *Triple-lok* is the standard of industry. More *Triple-lok* fittings are used on industrial machinery than any other fitting.

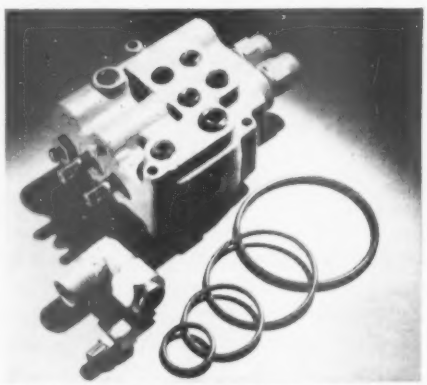
So, tube up and forget it. Use *Triple-lok* throughout your plant. Parker offers the widest range of shapes and sizes available . . . for tubing outside diameters from ⅛ through 2 inches. Ask your distributor for Catalog No. 4300.

TUBE AND HOSE FITTINGS DIVISION
The Parker Appliance Company
Section 404R, 17325 Euclid Avenue, Cleveland 12, Ohio

Parker
Hydraulic and fluid system components



3-piece Triple-lok fittings are stocked in steel, stainless steel, brass, and aluminum alloy —available in other materials on special order.



What other Parker products interest you? Ferulok flareless fittings? Hydraulic control valves? O-rings? Write Parker for information.

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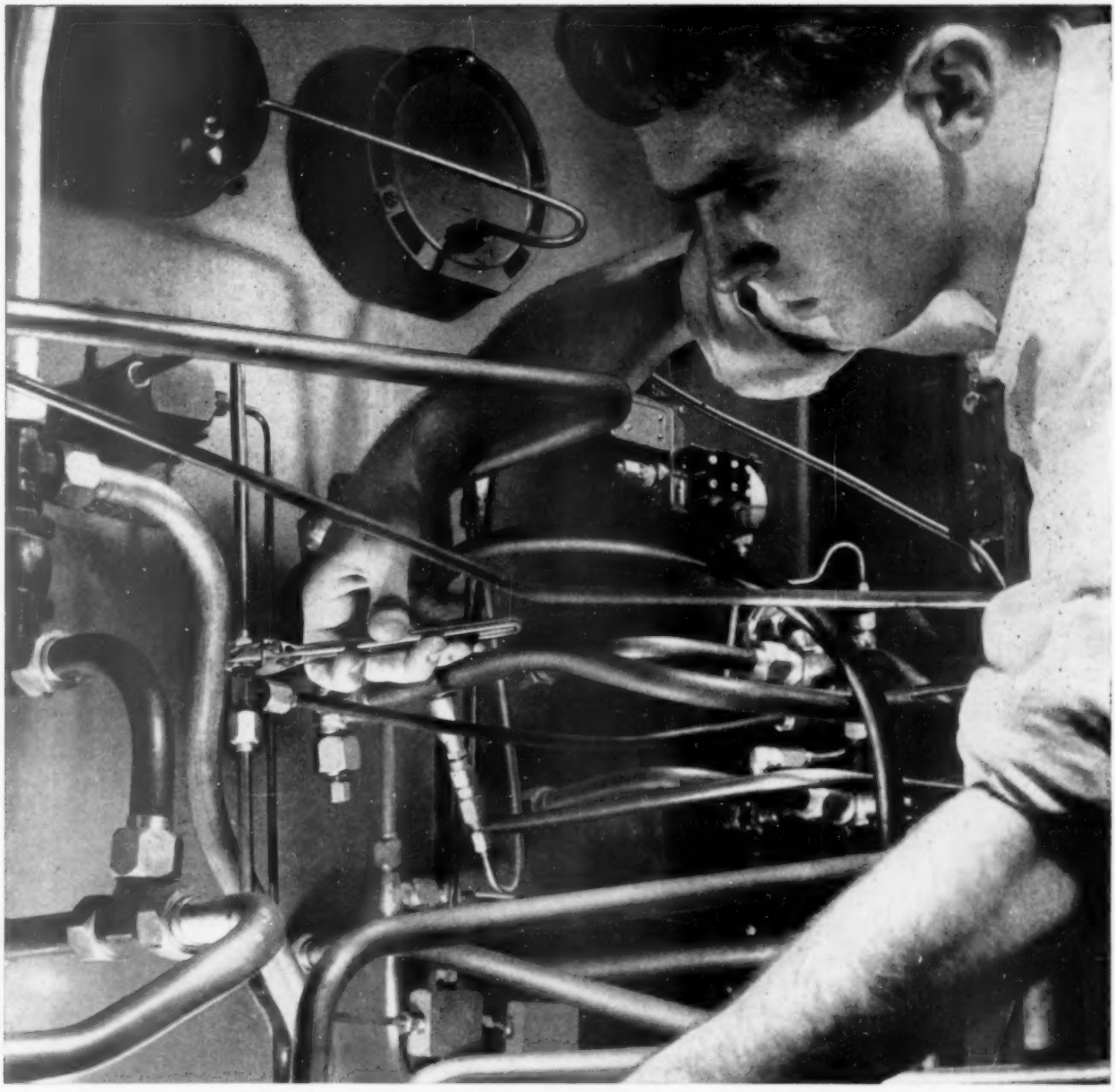
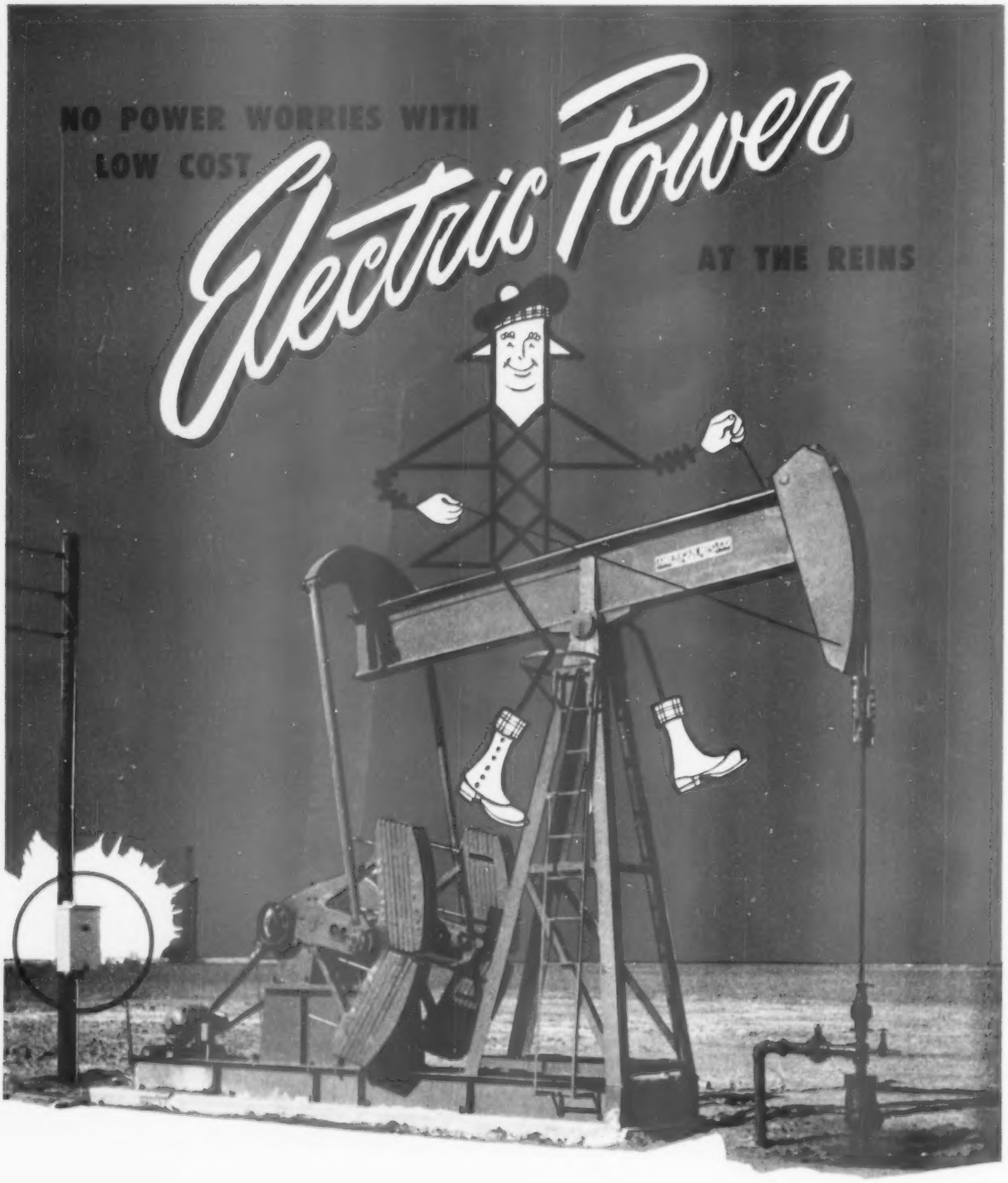
Bryson City, N. C.	Wallace Co. of N. C. P. O. Box 572
Buffalo 7, N. Y.	Whitehead Metal Products Co. 2128 Elmwood Ave.
Cambridge 39, Mass.	Whitehead Metal Products Co. 281 Albany St.
Cedar Rapidr, Ia.	Globe Machinery & Supply Co. 309 8th Ave. S. E.
Charleston, W. Va.	Persingers, Inc. 514 Elizabeth St.
Charlotte 1, N. C.	Industrial Piping Supply Co. 1501 Dowd Rd.
Chicago 14, Ill.	Wallace Tube Co. 1300 Diversey Parkway
Cincinnati 29, Ohio	Williams & Co. 3231 Fredonia Ave.
Cleveland 14, Ohio	B. W. Rogers Co. 1279 East 12th
Cleveland 14, Ohio	Williams & Co. 3700 Perkins Ave.
Columbus 8, Ohio	Williams & Co. 851 Williams Ave.
Dallas 9, Tex.	Metal Goods Corp. 6211 Cedar Springs Rd.
Davenport, Ia.	Globe Machinery & Supply Co. 410 E. Second St.
Dayton 10, Ohio	J. N. Fauver Co. 1534 Keystone Ave.
Denver 2, Colo.	Metal Goods Corp. 2425 Walnut St.
Des Moines 6, Ia.	Globe Machinery & Supply Co. East First & Court Ave.
Detroit 1, Mich.	J. N. Fauver Co. 49 West Hancock St.
Harrison, N. J.	Whitehead Metal Products Co. 1000 South Fourth Ave.
Houston 3, Tex.	Metal Goods Corp. 711 Milby St.
Houston 1, Tex.	Standard Brass & Mfg. Co. 2018 Franklin St.



Easiest way to install tubing, even in cramped quarters, is to use Parker *Triple-lok* flare fittings. Assembly torque is so low that you need only a small wrench for fitting make-up. The self-aligning sleeve acts as a lock washer, supports the tube, and damps vibration. *Triple-lok* is absolutely leakproof even under high pressures and temperatures.

Indianapolis, Ind.	Avels Sales & Engineering Co. 16 W. 22nd St.
Jacksonville, Fla.	Florida Metals, Inc. 2937 Strickland St.
Kansas City 16, Mo.	Metal Goods Corp. 1300 Burlington Ave.
Knoxville 5, Tenn.	Leinart Engineering Co. 412 E. 5th Ave.
Los Angeles, Cal.	Haskel Engineering & Supply 721 Broadway, Glendale 4
Los Angeles 12, Cal.	Metropolitan Supply Co. 353 E. 2nd St.
Memphis, Tenn.	J. E. Dilworth Co. 730 South Third St.
Miami, Fla.	Florida Metals, Inc. 4100 N. W. 37th Ct. Hialeah
Milwaukee 3, Wis.	Morman Belting & Supply Co. 522 W. State St.
Milwaukee 4, Wis.	Wallace Companies of Wisconsin, Inc. 838 South 6th St.
Minneapolis 15, Minn.	Vincent Brass & Copper Co. 124 Twelfth Ave. South
New Orleans 12, La.	Metal Goods Corp. 432 Julia St.
Newport News, Va.	Noland Company 27th St. & Virginia Ave.
New York, N. Y.	Nielsen Hydraulic Equipment, Inc. 5 Penn Place, Pelham Manor 65
New York 14, N. Y.	Whitehead Metal Products Co. 303 W. 10th St.
Odessa, Tex.	Snyder Co., Inc. 2604 Kermit Highway
Philadelphia, Pa.	Louis H. Hein Co. 15 W. Lancaster Ave., Ardmore
Philadelphia 40, Pa.	Whitehead Metal Products Co. 1955 Hunting Park Ave.
Pittsburgh 33, Pa.	Williams & Co. 901 Pennsylvania Ave.
Portland 10, Ore.	Hydraulic Power Equipment Co. 2316 N. W. Savier St.
Roanoke 10, Va.	Noland Company 1226 Center Ave. N. W.
Rockford, Ill.	Rockford Tool & Transmission Co. 802 Broadway
Salt Lake City 4, Utah	Pace-Turpin & Co. 726 South Third West
San Francisco 3, Cal.	General Machinery & Supply Co. 1346 Folsom St.
Seattle 9, Wash.	Palmer Supply Co. 222 Westlake North
Shreveport, La.	Standard Brass & Mfg. Co. 1557 Texas Ave.
St. Louis 15, Mo.	Metal Goods Corp. 5239 Brown Ave.
Syracuse 4, N. Y.	Whitehead Metal Products Co. 207 W. Taylor St.
Tampa, Fla.	Florida Metals, Inc. 222 N. 12th St.
Toledo 2, Ohio	Williams & Co. 650 E. Woodruff Ave.
Tulsa, Okla.	Ardun Supply Co. 303 S. Frankfort
Tulsa 3, Okla.	Metal Goods Corp. 302 N. Boston
Export	Mercator Corp. 438 Walnut St., Reading, Pa., U.S.A.



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are widely used to condense oil refinery vapors; to recover volatile solvents; to liquefy gases; to sub-cool boiler condensate; and for desuperheating. Customed to individual operations for either pressure or vacuum service, their design provides a minimum of pressure drop, prevents impingement, and minimizes stagnant areas.

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TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

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HEAT EXCHANGERS

G-R fin-fan... *from every point of view... top value in*

Air-Cooled Heat Exchangers

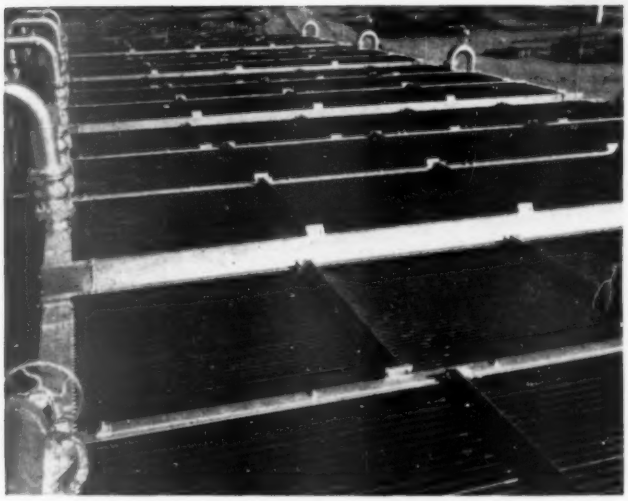
There's a mighty good reason why the G-R **fin-fan** is top value in air-cooled heat exchangers.

The reason is the experience behind this unit. This experience includes 85 years of building heat transfer apparatus, 25 years of experience in specializing on extended heat transfer surfaces as used in air-cooled exchangers, the operating records of hundreds of **fin-fan** installations all over the world, and the results of tests on the cooling sections, drive mechanism and structure that combine to form the G-R **fin-fan** air-cooled exchanger.

For assurance of best results from an air-cooled exchanger, investigate G-R **fin-fan.**

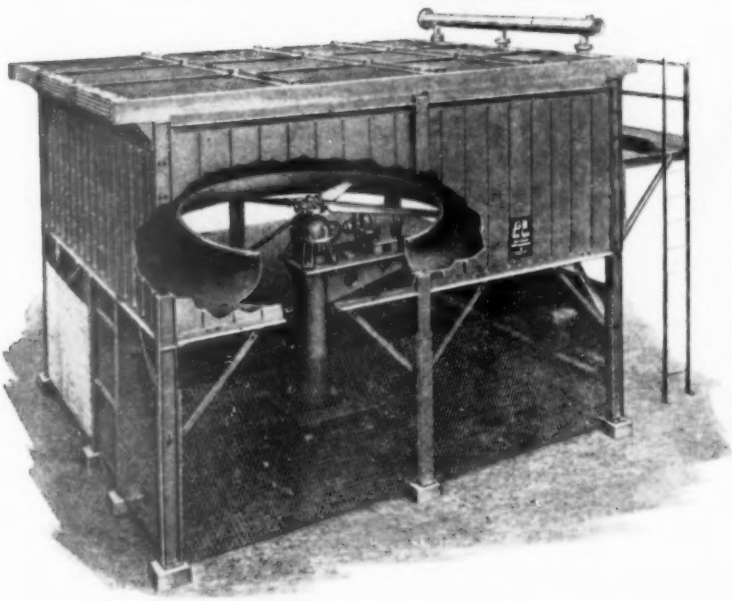
THE GRISCOM-RUSSELL CO., MASSILLON, OHIO

G-R HEAT TRANSFER APPARATUS **fin-fan** Air-Cooled Heat Exchanger



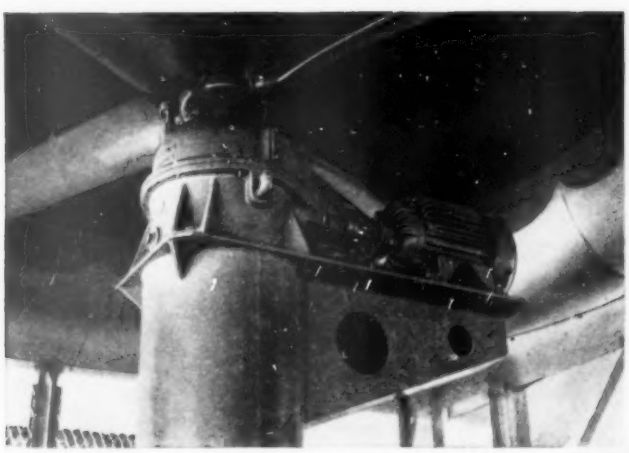
FROM ABOVE

This is a view of the K-Fin Sections which form the heat transfer surface used only in the G-R **fin-fan**. Many millions of square feet of this exclusive helically-finned surface are being used in more types of air-cooled services than any other design . . . one of the reasons for their dependable ratings as well as their dependable design and construction.



FROM THE SIDE

Here you see the strong reinforced construction that is built to withstand wind pressures of more than 40 lbs. per sq. ft. . . . the pre-fabricated, pre-drilled structure that is specifically designed for speed and convenience of erection and connection to additional units . . . the slope of the K-Fin Sections to assure drainage . . . and the protecting fence which completely surrounds the unit.



FROM BELOW

You are looking at a typical drive mechanism for G-R **fin-fan**. Note the mounting of driving motor and gear reducers . . . one of many alternative arrangements . . . the powerful fan of proven performance, and the smooth bell ring for maximum aerodynamic efficiency.

GR324

SERVING CANADA'S *Oil Industry*

In field and refinery operations custom steelwork by Dominion Bridge plays an important role. Our Western plants have been expanded and re-equipped to meet the growing needs of Canada's thriving oil industry—including complete facilities at Edmonton for the fabrication of Class I welded refinery pressure vessels. Some examples of our work are shown below.

Write to Box 280, Montreal, for fully illustrated Booklet BSE "Builders in Steel".

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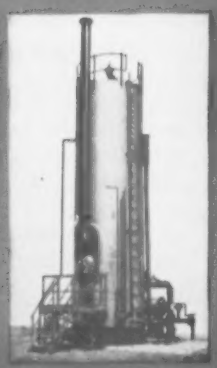
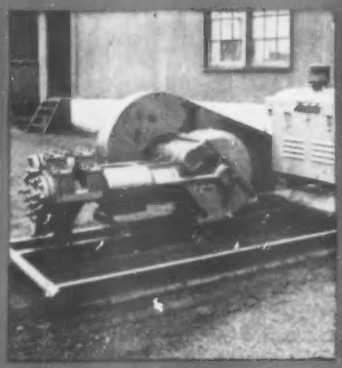

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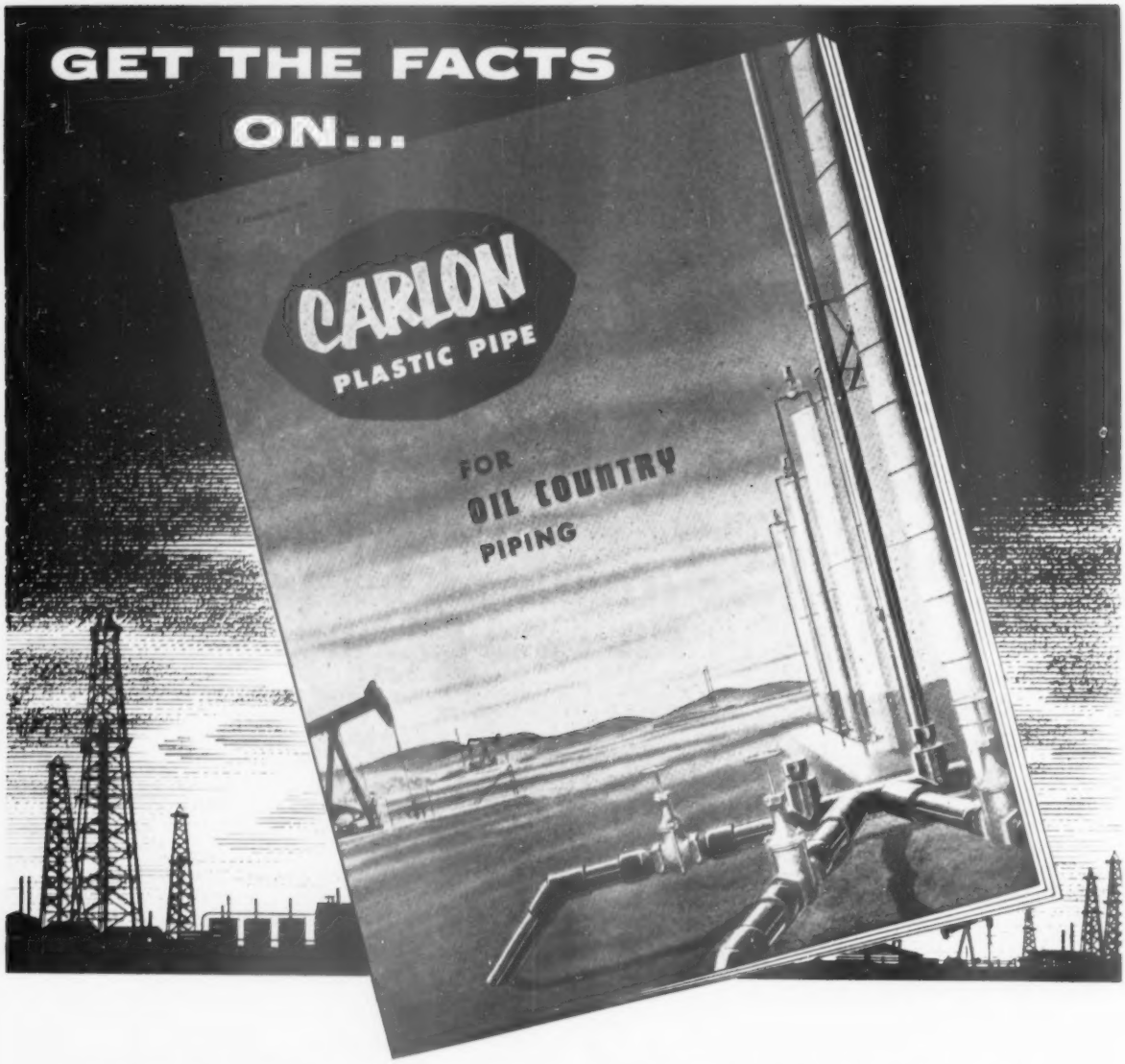
GET THE FACTS ON...



● Just off the press! This is your opportunity to get the first factual data on the use of plastic pipe in the oil country! New catalog recommends working pressures . . . includes flow charts . . . provides temperature vs. tensile curves . . . lists chemical resistance data.

CARLON offers piping advantages when used for lead, gathering and distribution lines, salt water disposal tubing, risers, gas vents and fresh water transmission. CARLON combines economy of installation with extended maintenance-free working life.

Extruded from inert and insulating materials, CARLON is unaffected by acids, alkalies or electrolytic action. CARLON pipe resists corrosion from salt water and other wastes as well as sulphurous waters and sour crude.

CARLON can be installed in less time and with less effort. It is lightweight and makes-up fast. Permanent connections can be made to metallic lines with plastic fittings.

Get the facts on CARLON Plastic Pipe for oil country. Send today for catalog . . . or contact Carlon field engineers direct for specific application advice.

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CARLON PLASTIC PIPE IS PRODUCED IN TEXAS, COLORADO, OHIO, OREGON, NORTH CAROLINA AND ACTON, ONTARIO, CANADA

America's New Railroad

Looking ahead on the Santa Fe

You've been reading a lot this year about things that make and keep the Santa Fe "America's New Railroad."

New cars, new locomotives, new yards, new tracks, new communication methods, new streamliners and new freight services.

So it goes, day-after-day, on the Santa Fe—this building new. For only by constantly building and rebuilding can a railroad stay new and ready for the future.

So it will be in '54 and in the years ahead—with important new projects like these now under way:

NEW CHIEF TO SAN FRANCISCO... In early '54 a whole new streamlined train—the *San Francisco Chief*—from Chicago to the Golden Gate in 47½ hours, via the San Joaquin Valley through the colorful Southwest Indian Country.

NEW RAILROAD TO DALLAS... 48.5 miles of it. Now being planned to provide direct mainline service to shorten time and mileage for passengers and freight between Dallas and Chicago and points in Oklahoma, Kansas and the Midwest.

NEW IMPROVEMENTS ALL ALONG THE LINE... Little things, big things—all things that are important to the people who ship and ride on "America's New Railroad."

The millions of dollars this newness costs Santa Fe doesn't cost *you* a single penny in the taxes you pay.

* * * *

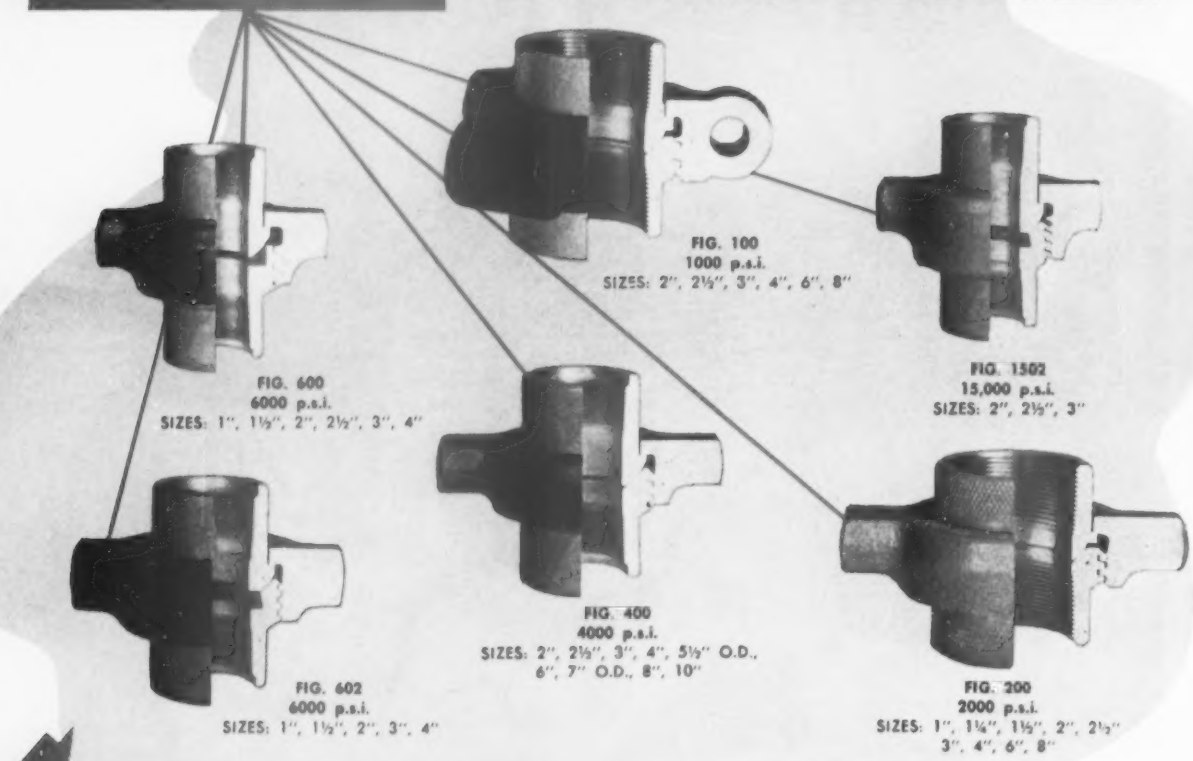
All these things help to provide better service for Santa Fe patrons. They inspire Santa Fe people—the men and women whose thoughts, ideas and physical efforts are what make the operation of "America's New Railroad" possible.

But their feeling for their railroad goes much deeper. It's a combination of things—a great respect for tradition, mixed with equal respect for the daring it has taken to break with tradition. It's a sharing of the "let's-do-it-better" spirit that keeps the Santa Fe growing *newer* every day.

PROGRESS THAT PAYS ITS OWN WAY

Santa Fe

UNIONS ARE OUR BUSINESS



That's why it's wise to Standardize with WECO

• Almost 20 years ago we pioneered Acme-thread wing-nut unions for the oil industry and have devoted our engineering skill and manufacturing craftsmanship to their production and improvement ever since.

We make it our business to give you unions that assure a safe and sure seal . . . that withstand the severest abuse and hardest service . . . that are conservatively pressure-rated . . . that are easiest to make-up and quickest to break out.

Whatever your service requirements, there is a WECO Union that is exactly right for the job. And this, we believe, is the basis for longer service and maximum economy from unions.

Ask your WECO Representative or your Supply Store for the WECO Union that will give you the utmost in economy and service wherever unions are needed.

WECO
UNIONS

It's Wise to Standardize with... WECO ...

WELL EQUIPMENT MFG. CORP.
Division of Chiksan Company
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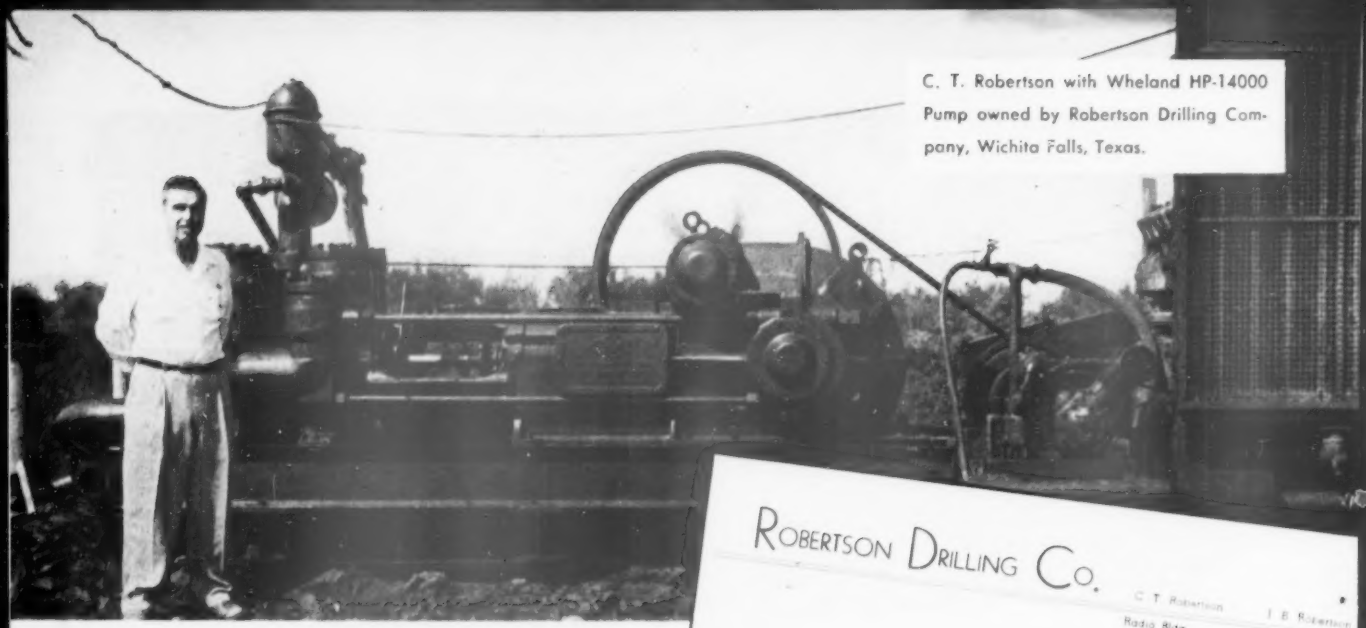
P·E·S·A

MOST COMPLETE LINE OF WING UNIONS IN THE WORLD

As each year fades into its own twilight of time, we feel it wise to re-establish ourselves and look back upon our new acquaintances and our many longstanding friendships with extreme pride.
It is these friends to whom we are indebted for our success in business and in life. With this thought in mind, we take this opportunity to extend to you our Yuletide message of sincere thanks with greetings and best wishes for a prosperous New Year.
Mrs. Laura B. Sillers
President
PEERLESS MANUFACTURING COMPANY
Walnut Hill Lane and Old Denton Road
Dallas, Texas



C. T. Robertson with Wheland HP-14000 Pump owned by Robertson Drilling Company, Wichita Falls, Texas.

"I have had approximately 20 drilling rigs in my life, with all makes of pumps, and **I WILL POSITIVELY STATE THAT YOUR NEW PUMP IS**

BY FAR THE BEST"

WHELAND

HP-14000 7½" x 14"
DUPLEX SLUSH PUMP

350 Horsepower

nominal input at 60 RPM

Discharge pressure with 7½" liners 838 PSI
Discharge pressure with 5½" liners 1627 PSI

WRITE FOR DETAILED BULLETIN

ROBERTSON DRILLING CO.

C. T. Robertson — T. B. Robertson
Radio Bldg — Phone 5756
WICHITA FALLS, TEXAS

October 14, 1953

Mr. G. F. Street,
The Wheland Company,
Chattanooga, Tennessee.

Dear Mr. Street:

At the end of May, I purchased through Industrial Supply Company one of your new HP-14000 pumps. We have cut over 50,000 feet of hole in the North Texas area with your pump, and have never lost a minute of time. We have found that with your new pump and our new mud system, which consists of internal flush pipe, big hose and big kelly, with large bore drill collars, that we have been able to cut our drilling time on our 4,000 foot wells from approximately 12 to 13 days, to six or seven days. We have cut the number of bits used from 12 to 13, down to six or seven per well. Also, we have run jet bits and find that your pump has all the capacity that is needed to run jet bits.

I have had approximately 20 drilling rigs in my life, with all makes of pumps, and I will positively state that your new pump is by far the best, both from the service standpoint and it certainly could not be beat from the cost standpoint when you consider the capacity and pressures which it is capable of running under. You may feel free at any time to use my name as a reference on your pump.

Very truly yours,
ROBERTSON DRILLING COMPANY
BY: C. T. Robertson
C. T. Robertson

WHELAND

THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.
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EXPORT DISTRIBUTOR: Lucey Export Corporation, 233 Broadway, New York 7, New York — Broad Street House, London, E. C. 2, England

Long range, solid cone of Rockwood WaterFOG snuffs out fire.

"Little Mo" knocks 'em down

He *likes* to go to blazes.

"Little Mo" — a small fire truck that's packed to the hilt with Rockwood fire-fighting equipment — streaks to fires, knocks 'em down and quenches them in seconds. Can be operated by one man, if necessary!

In the test above, fuel in a pit under the tank cars was set on fire — and more fuel poured on top of the cars from pipes. This, too, was ignited and the blaze given a minute's start. In rushed "Little Mo" — and out went the fire in 45 seconds, choked off by Rockwood WaterFOG from Rockwood's Remote Manual Control Turret. What's more, 10 inches of water still remained in "Little Mo's" 200-gallon booster tank, after the fire was out.

It's Loaded! "Little Mo's" equipment includes: 4 stage centrifugal pump with electric primer, 200-gallon booster tank, Rockwood Dual Suction Proportioning System for FOAM and "Wet", Rockwood Remote Manual Control Turret controlled from within cab, Rockwood Ground Sweep Nozzles, Rockwood Remote Control Ball Valves, 2 Hannay reels with 200 feet of high pressure hose with new Rockwood High Pressure Handline Nozzle on each reel.

Thanks to Rockwood portable fire-fighting equipment, even a small truck like "Little Mo" can battle fires with powerful efficiency. The Turret Nozzle, alone, discharges solid water stream, WaterFOG, FogFOAM, solid FOAM, "Wet" solid water, and "Wet" WaterFOG! Rockwood engineers water to cut fire losses.

Leading manufacturers of fire trucks will install Rockwood Fire Fighting Products at your request.

ROCKWOOD SPRINKLER COMPANY

ROCKWOOD *Engineers Water . . . to Cut Fire Losses*

SEND FOR THIS INFORMATIVE BOOKLET

ROCKWOOD SPRINKLER COMPANY
Portable Fire Protection Division
104 Harlow Street
Worcester 5, Mass.

Please send me your illustrated booklet on Rockwood fire-fighting products.

Name .....
Title .....
Company .....
Street .....
City .....
Zone ..... State .....

*CP CONTROLLED PRESSURE

Pressure is something you have to control, whether it's built up on the outside of a deep-sea diving suit, on the inside of a teakettle, or in the bloodstream of an angry or excited person.

Pressure is also a problem when you pump oil through an engine. Sometimes the oil is cold and sluggish. Other times it is hot and easy-flowing. You can't always wait for the oil to be at just the right temperature before you start the engine and need lubrication. You want the lubricant *now*, and you want it clean and dependable. That's the job of your filter.

Most filters don't function properly until the oil has been warmed up. The oil gets by-passed instead of cleaned. But that is not the case when you use Winslow "CP"* (Controlled Pressure) Elements. An exclusive and patented method of constructing Winslow "CP"* Elements makes sure that either hot or cold oil passes through the element instead of the by-pass, insuring positive Full Flow Filtration.

WHY NOT GET FULL INFORMATION ABOUT WINSLOW "CP"* FILTRATION. SEND FOR THE NEW FREE BOOKLET THAT TELLS YOU ALL ABOUT IT!

WINSLOW FILTERS

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Winslow Engineering Company • 4069 Hollis St., Oakland 8, Calif.

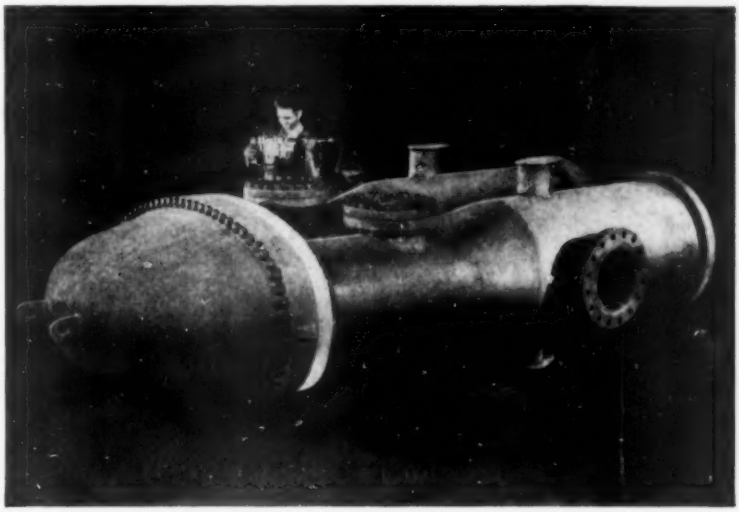
PROCESS EQUIPMENT NEWS

PUBLISHED BY FABRICATED PRODUCTS DIVISION, THE W. M. KELLOGG COMPANY DECEMBER 1953

Unique Bundle Puller Makes Gains Abroad

Kellogg's Hydro-Ejector, a special device for hydraulically removing and retracting tube bundles, is now standard equipment in many refineries. The use in the United States has generated considerable interest abroad, and independents as well as U. S. affiliates are using this portable unit to speed maintenance work.

Experience has proved that two men can handle even the largest bundles, taking less than 25 minutes to perform the operation of ejecting or retracting any size unit a distance of eight feet. The Hydro-Ejector can exert a force of 12,000 pounds, sufficient to overcome dirt formations that cause many bundles to stick.



Special High-Temperature Exchangers for Gasoline-from-Coal Synthesis

Illustrated is one of ten unique heat exchangers especially designed and fabricated by Kellogg for use in a gasoline-from-coal synthesis plant under construction in South Africa. This exchanger is being made ready for hydrostatic testing.

When in service the units will perform a highly critical function in the pre-heating of gas in a catalytic reforming unit. Each capable of operating under temperatures of 1625°F and pressures of 365 psi, the exchangers are being fabricated in Kellogg's shops rather than overseas because of Kellogg's extensive engineering and fabrication experience in production of alloy equipment for handling critically high temperatures and pressures.

Tubes and tube sheets of the exchangers are fabricated of Type 310 stainless steel. The shells are internally insulated.

In the reforming unit, residual hydrocarbons in synthesis gas, produced in the coal gasification plant, and recycle gas from the synthesis section are converted to additional synthesis gas.

High-Pressure Units Scheduled for Chemical Plant

Four special high-pressure exchangers for a major chemical processor are now being designed in Kellogg's heat transfer division.

They are of the integral tube sheet-channel type because of the operating pressures which will be in the neighborhood of 1000 psi on the tube side. Each will contain a U-tube bundle consisting of 32-foot long copper tubes.

For further information, details of methods, etc. contact

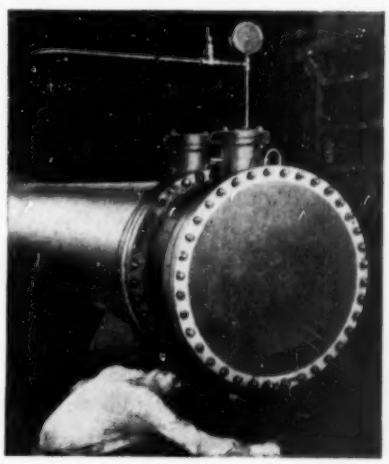
FABRICATED PRODUCTS DIVISION
THE
M. W. KELLOGG
COMPANY
225 Broadway, New York 7, N. Y.
or offices in Jersey City, Buffalo, Los Angeles, Tulsa, Houston, Toronto, London & Paris

KELLOGG PULLMAN

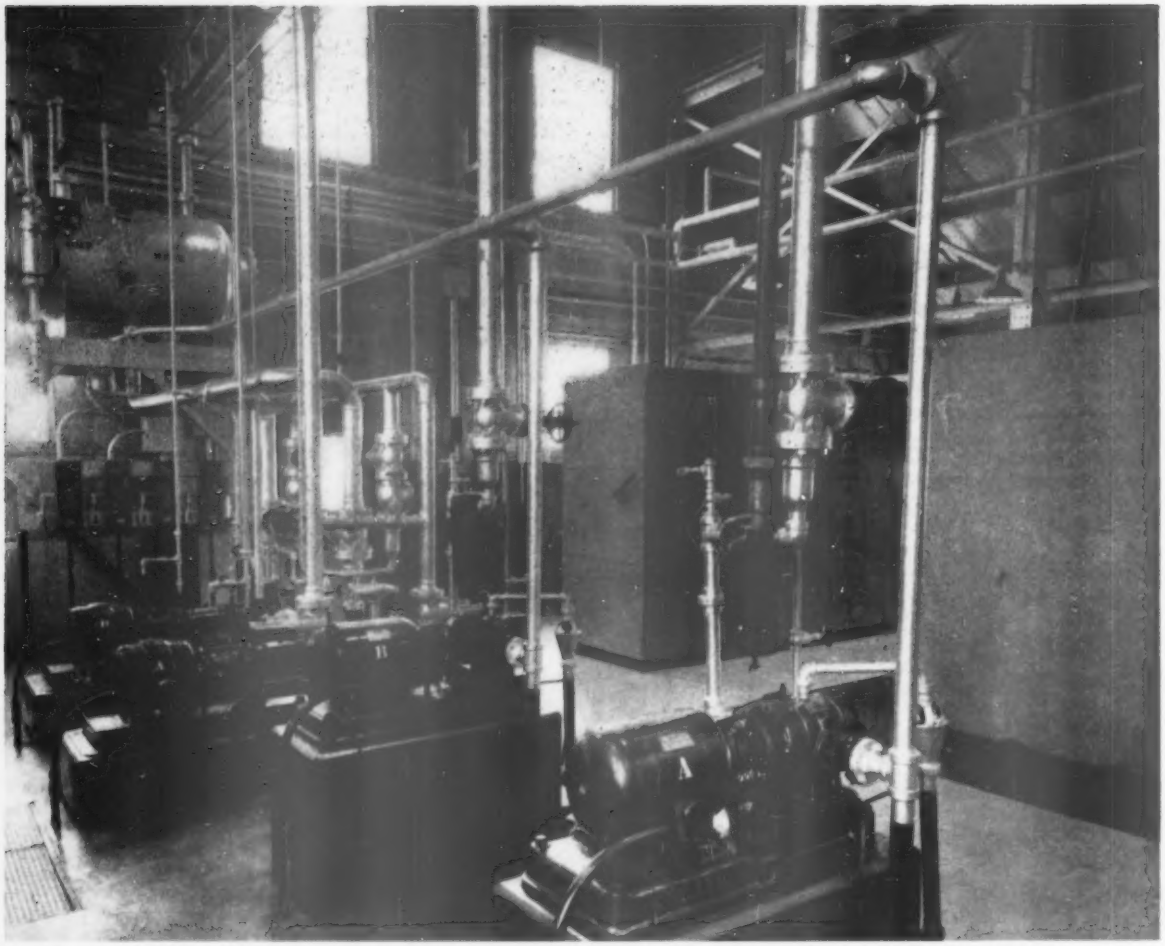
Reflux Exchanger for Combination Unit

This reflux-crude exchanger is one of many exchangers, coolers and condensers recently completed in the shops for a combination refinery in Brazil. Here it is shown undergoing hydrostatic testing.

The unit is 35" inside diameter, of steel construction throughout, using ¾"OD tubes on square spacing. When installed the unit will preheat crude against reflux gas oil raising its temperature from 60° to 280°F.



EXCHANGERS
THIN WALL ALLOY PIPING
CLAD STEEL VESSELS
CONDENSERS
FRACTIONATING TOWERS
PRESSURE PIPING
DIGESTORS
COOLERS



Two V-12 Vacuum Pumps, 1750 r.p.m., rated 47 c.f.m. referred to 24-inch vacuum intake, handling non-condensibles from turbo-generators at 5000 ft. elevation.

another

Fuller ROTARY VACUUM PUMP INSTALLATION

Those who use Fuller Rotaries for gas-gathering and boosting service also find other applications for them.

In the Elk Basin Unit Pressure Maintenance Plant, operated by Stanolind Oil and Gas Company in Park county, Wyoming, Fuller Rotary Compressors are used to supply pulsation-free air for plant services. Other Fuller Rotaries, as illustrated above, handle non-condensibles from turbo-generators.

Fuller Rotary Compressors serve in every industry where reliable, economical, low-maintenance operation is important in capacities to 3300 c.f.m. and pressures up to 125-lb. per square inch. Write today for complete information. Fuller Company, Catasauqua, Pennsylvania.

Fuller... high efficiency, vane-type rotary compressors for gas gathering, gas boosting, repressuring flare gas, refrigeration, engine starting, pneumatic power, pneumatic controls, general plant air, air lifts, and vacuum service.

C-242
2248

How SUNRAY OIL boosts pipe line capacity 25%

Three years ago production skyrocketed at the Sunray Oil Corporation refineries in Duncan and Allen, Okla. Expansion throughout the system overloaded the 6-inch pipe line between the two cities. Bigger pipe was not available.

Sunray engineers hit on a cost-cutting solution—installed three electrically powered booster stations between regular pumping stations. They know that electric motors cost less to install . . . require little maintenance . . . are easily adapted to remote control circuits.

Then engineers selected an RCA 960-mc Microwave radio-relay system to effect complete remote control of the *"boosters"* from regular pumping stations. Microwave stations spaced miles apart proved cheaper to install and maintain than direct wire. And Microwave systems are virtually weatherproof.

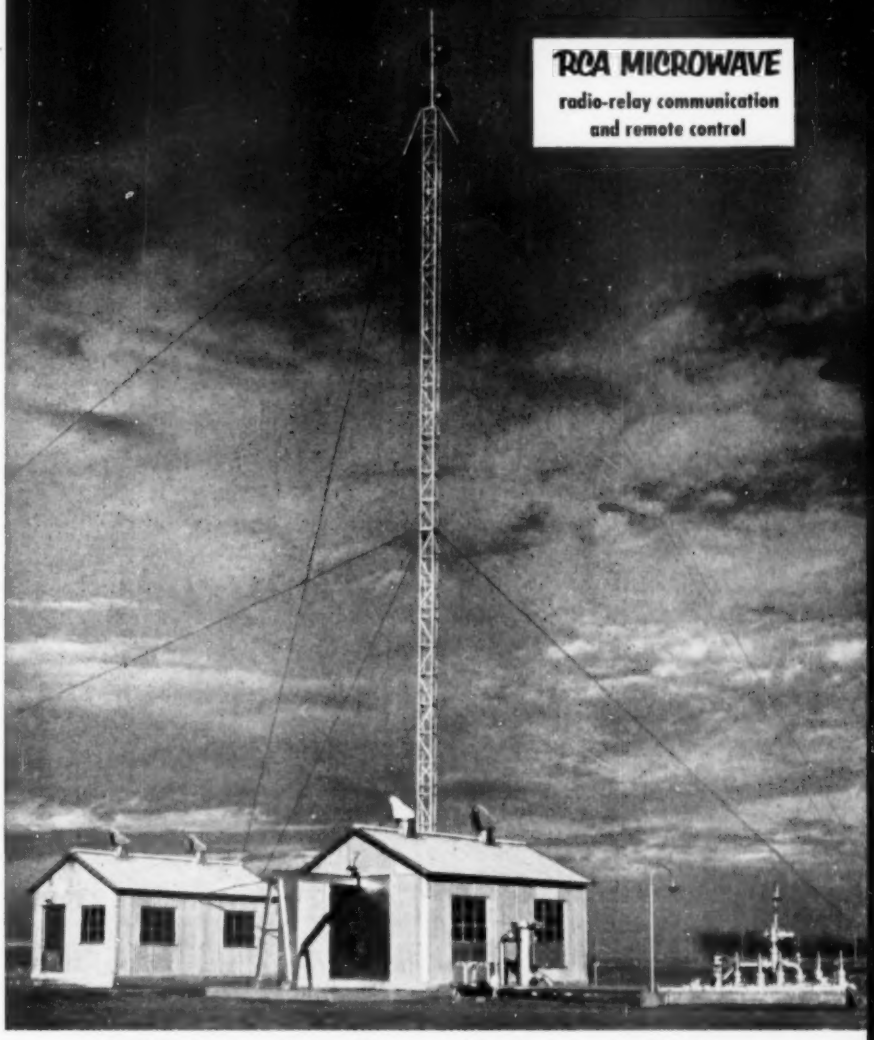
When the Sunray microwave-operated *"boosters"* were put in operation on January 31, 1952, *the pipe line's capacity immediately increased 25 per cent!*

RCA Microwave "beams" highly directional radio signals from station to station by "dish" antennas. Since 1946 RCA has installed many fully reliable Microwave systems, some over 1,000 miles long. *All have proved themselves in performance*—for utilities, government agencies, telegraph companies, turnpikes, as well as pipe lines.

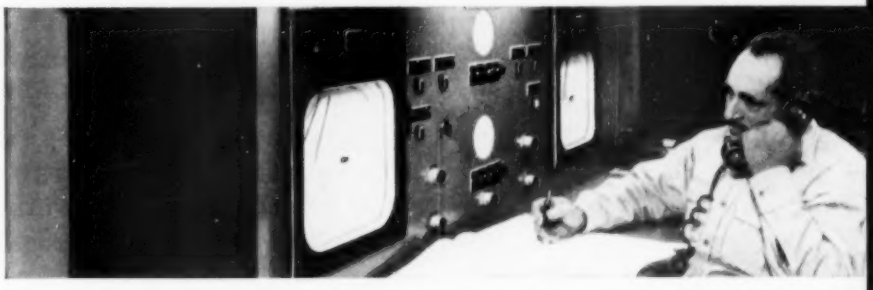
In addition to remote control and supervisory functions, RCA Microwave provides as many voice and teletype channels as you need—and does it with a minimum of frequency space. It employs readily available tubes and familiar circuits which are easy to service. It interconnects with your telephone lines and switchboards.

If you desire, RCA supervises survey, construction and installation—offers a complete single-source, single-responsibility service. And only RCA can provide the nationwide service facilities of the RCA Service Company.

For more information, mail the coupon ▶



Unattended booster station at Pernell, Okla. Radio-beam signals via RCA Microwave operate the booster by full remote control. Maintenance man inspects each station once every 24 hours.



Telemeter charts give continuous record of power and pressures at boosters. Operator remote-controls valves and pumps of booster stations. Signal lights indicate equipment failure and emergency generator operation. 2-way voice channel contacts maintenance personnel.

RCA **RADIO CORPORATION of AMERICA**
COMMUNICATIONS EQUIPMENT CAMDEN, N. J.

Dept. 89 XC, Building 15-1
Without obligation on my part, please send me your free booklet on:
☐ A Booster Station Microwave System ☐ Pushbutton Operation of Boosters

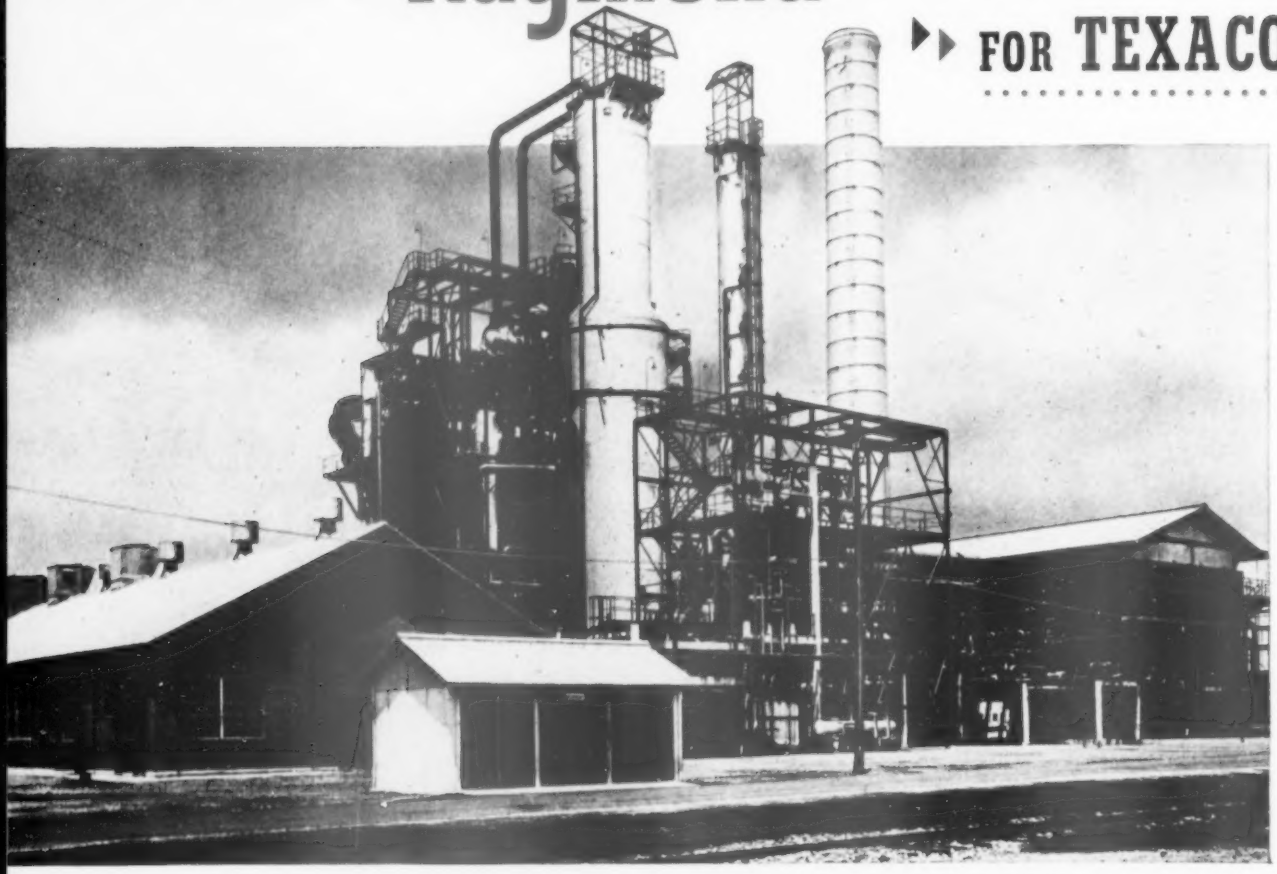
Name _____ Title _____ Company _____

Address _____ City _____ Zone _____ State _____

☐ Have an RCA representative get in touch with me.

59 MILES OF Raymond PILES...

FOR TEXACO



THE TEXAS COMPANY is one of the many oil companies across the country that have selected Raymond for their foundation work. At their Eagle Point Works in Westville, New Jersey, over 59 miles of step-taper piles—10,028 piles in lengths up to 80 feet—were driven by Raymond to support a new Crude Unit and related structures.

Because of the wide geographical distribution of equipment and experienced personnel, you are assured of prompt and efficient service when you specify Raymond for your foundation projects.

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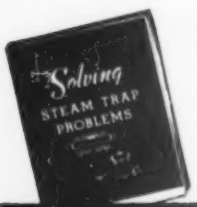

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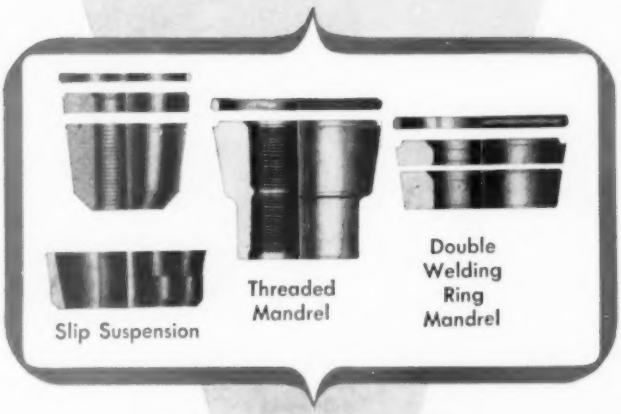
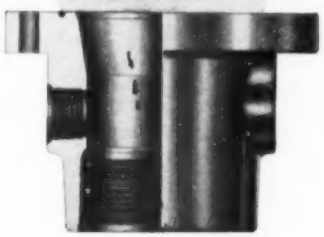


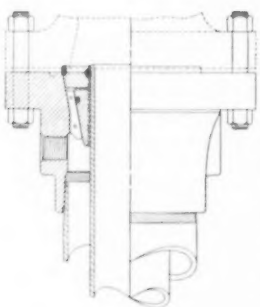


This Rector Type MS Casing Head offers you slip suspension or the choice of two types of mandrel suspension . . . all of which utilize the famous Rector metal-to-metal seal.

In the 8⅝" size, especially designed slips fit directly into the head body. In the 9⅝" and 10¾" sizes, the slips ride in a special slip bowl. The metal-to-metal, leakproof seal is obtained by use of a single welding ring placed directly above the slips and welded to the casing. An API Ring Gasket at the juncture of the welding ring and head body completes the seal.

For mandrel suspension you have the choice of a threaded or double welded type. With either hanger an API Ring Gasket acts dually as the sealing medium and hold-down. These mandrel hangers are installed the same as in the Type M Rectorhead Casing Head which has a restricted ring groove to permit installation of a higher working pressure head without use of additional flanges. The Type MS Casing Head is similar in design but lighter in construction than our Type RH and is comparable in price and setting depth to our Type M Mandrel Hanger Casing Head.

Ask your nearest Rector Representative or authorized Supply Store about the Type MS Rectorhead Casing Head for your next well.



Assembly of Type MS Rectorhead Casing Head utilizing slips and slip bowl. Available only in three sizes: 10¾", 9⅝", and 8⅝", and in Series 600 and 900 only. Head is furnished complete with slips, slip bowl, single welding ring, bolts, nuts and API Ring Gasket. Heads are available with threaded or flanged side outlets.

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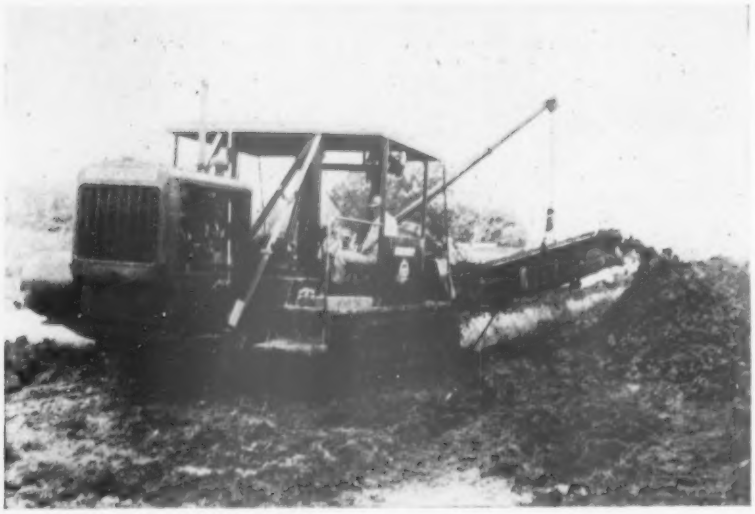

Experienced pipeliners will tell you there's nothing like a Cleveland for dependable production, even on the wet, sloppy jobs. They know they can count on their Clevelands to see them through in *any* kind of going . . . because of Cleveland features like these:

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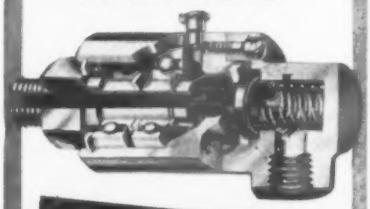

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Get the facts about the new Deublin CHATTER-PROOF Quick-Release Valve

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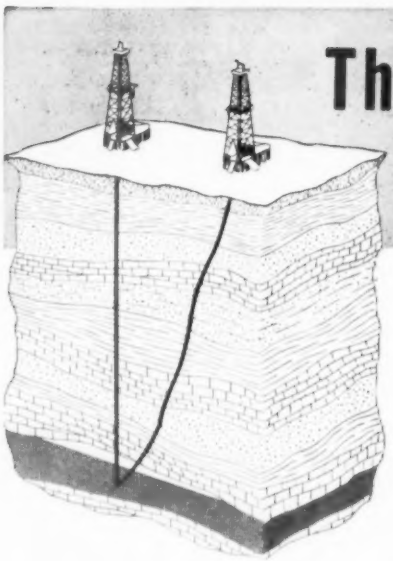

Generally a straight hole is the most economical distance from your derrick to bottom. The Sperry-Sun Single Shot will help keep your hole running the way you want it with little effort and little expense.

Knowing exactly your inclination and direction at all times is worth more to you than even the cost of a solid platinum Single Shot instrument. And the Sperry-Sun Single Shot gives you this vital information quickly and accurately at but a trifling cost.

The Single Shot prints the inclination and direction on a photo-paper disc. It will give a valid reading only when the instrument is at rest, thus providing a positive check of the accuracy of the reading. Loading and developing the photo-disc and running the survey are so simple that practically anyone can do it. The Single Shot may be run in an open hole, or, using a non-magnetic drill collar (rented from Sperry-Sun) it may be go-devilled or run in on a wire line.

It is just good insurance to run Sperry-Sun Single Shot Surveys in every hole you drill — exact inclination and directional measurements can easily be worth a hundred times the cost involved.

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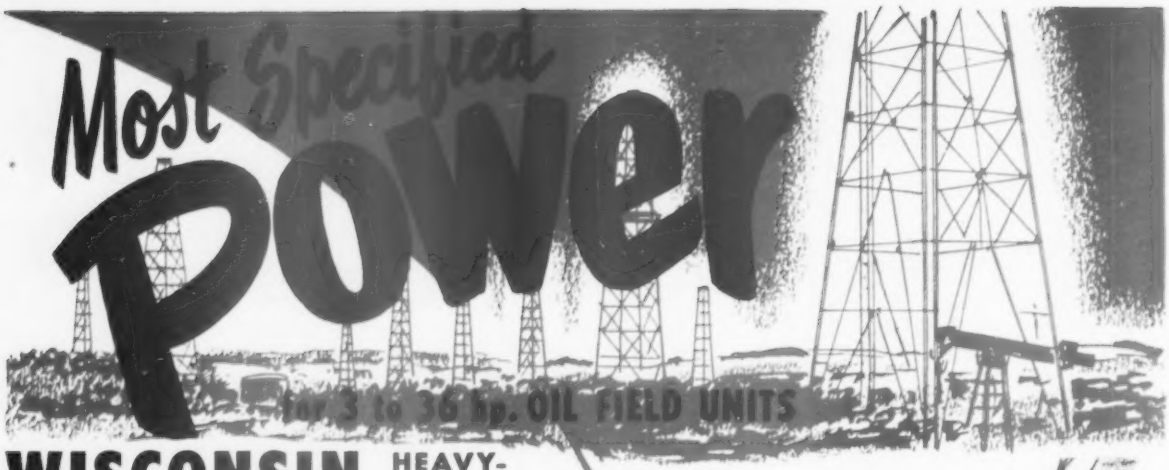

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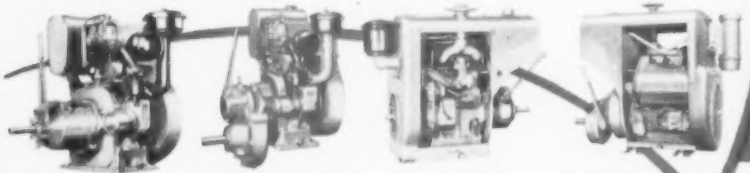
Wisconsin Heavy-Duty Air-Cooled Engines are supplied in 4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 36 hp. Prompt parts service available on all models.



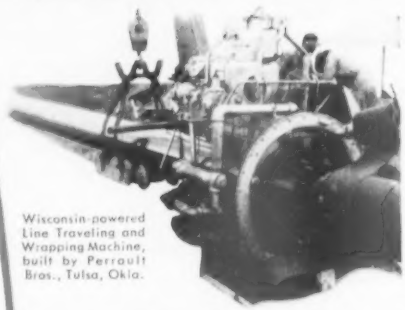
4-cycle single-cylinder, 6 to 9 hp., with clutch.

4-cycle single-cylinder, 6 to 9 hp., with clutch reduction.

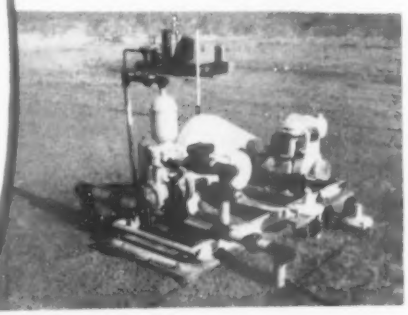
2-cylinder, 7 to 15 hp., power unit with clutch.

V-type 4-cylinder, 15 to 36 hp. with clutch reduction.

Wisconsin-powered Wet Auger Drill, built by Sewell Products Co., Tulsa, Okla.



Wisconsin-powered Line Traveling and Wrapping Machine, built by Perrault Bros., Tulsa, Okla.



Wisconsin Engine model AEH with clutch driving a Goulds reciprocating pump. Supplied by Harley Sales Co.

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MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

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A-7693-1PC

New Injection Work Planned For Scurry's Canyon Reefs

by Joseph A. Kornfeld
Mid-Continent District Editor

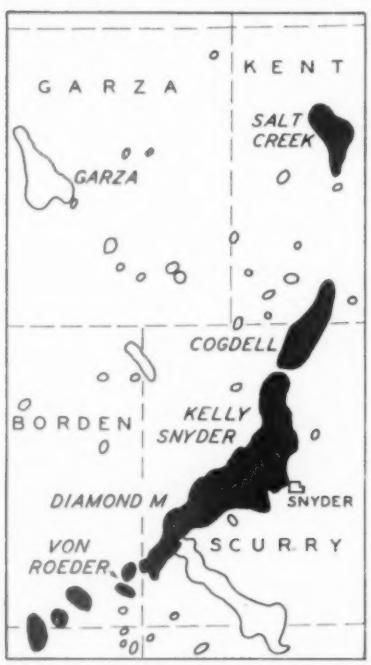
THE Scurry Trend—one of the nation's largest new reserves—is now fast becoming the injection trend.

Scattered along an 84-mile reef front are a series of buried reef structures in West Texas in Kent, Scurry, Borden, and Howard counties. These reefs vary from a broad low dome covering 50,000 acres, such as SACROC unit, to steeply dipping pinnacles pitching 1,500 ft. per mile with thick oil columns up to 770 ft., as at Cogdell. This new reserve, largely developed since 1948, has produced more than 200 million barrels of oil during the past 5 years.

However, producing these fields to obtain the highest possible efficiency has presented major problems. Generally, the normal or "natural" recovery efficiency of these reefs would not be high. With few exceptions, the production history has followed the pattern of rapid pressure declines and rapidly rising gas-oil ratios. This behavior is due to the fact that most of these fields operate under an internal gas expansion drive and a fluid-expansion drive. Inherently this mechanism has a low recovery efficiency; however, a few of the small Scurry Trend fields —Vealmoor, Vealmoor East, and Good —operate under effective water-drive mechanisms.

Kelly-Snyder and Diamond M fields, discovered about 1948, are not blessed with an effective natural-water drive, despite the fact that there may be indications of water influx along the southern edge of Kelly-Snyder. Reservoir pressures, as a consequence, fell off rapidly, at times at the rate of 1 psi. per day.

Because of the rapid pressure slump, alarming both the Texas Railroad Com-



CANYON LIME REEFS which comprise the famed Scurry trend (solid areas) are the locale of one of the greatest concentrations of water and gas-injection projects in the nation today.

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AUTOMATIC CONTROLS

FOR OUTDOOR, INDOOR OR EXPLOSIVE ATMOSPHERES

APPLICATION: Mercoid Controls are adaptable to a wide range of applications involving the control of pressure, temperature, liquid level or mechanical movement.

ELECTRICAL CONTACT: Mercoid Controls incorporate sealed mercury switches which are impervious to dust, dirt and corrosion. These switches can give a million operations without deterioration.

CIRCUIT ARRANGEMENTS: There are any number of special circuits available to meet your particular problem.

OPERATING RANGES—SENSITIVITY: Mercoid Controls are available in many ranges with the sensitivity your application requires.

CONSTRUCTION: Standard type instruments are furnished with steel case. Special cases and housings are available for protection against weather, excess vapors, splashing or explosive atmospheres.

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PRESSURE

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mission and operators alike since 1948, pilot gas and water-injection programs have been conducted in these and other fields along the Scurry trend in an effort to improve recovery efficiencies.

SACROC unit . . . This well one of the nation's largest water-injection projects is currently awaiting approval from the commission to inject water. Commission approval to unitize was granted on January 31, 1953.

Reservoir pressures in the SACROC unit, originally 3,122 psia., have dropped to nearly one-half of that value and produced gas-oil ratios have risen to 1,300 cu. ft. per barrel from the 888 cu. ft. per barrel originally in the reservoir.

SACROC engineers are now prepared to initiate a full-scale water injection program, pending on commission approval. The operators have contracted to take 200,000 bbl. a day of water from the Colorado River Dam Authority at Big Spring, Tex., which has in excess of 150 million barrels of water impounded behind its large dam near Big Spring. Feasibility of injecting fresh water into the Canyon reef at SACROC has been proven by pilot injection experiments at Diamond M reservoir where several thousand barrels of fresh water were injected without plugging the formation.

Salt Creek . . . First application of center-to-center full-section water injection to a West Texas reef has been made at Salt Creek field in Kent County. Faced with rapid pressure decline, Salt Creek operators unitized the field in April 1952, initiated gas injection in May, and water injection in December of that year. Salt Creek has obtained promising results from a year's experience with this type of water injection along the crest of the structure. This new method seeks to displace unshrunk oil with high pressure from the higher-pressure areas of the reservoir.

Reservoir pressures, initially about 2,940 psig. in April 1950, had declined 840 psi. when water injection was introduced. Now pressure decline has been halted. After injection of more than 1 million barrels of water this year into the major axis of the reef, neither bypassing nor channeling of water has occurred in the producing wells adjacent to injection wells. Currently, 12,000 bbl. of water daily are being injected through the full reef section.

As to the gas-injection part of the program, after input of more than 1 billion cubic feet of gas in the last 1½ years, there has been no areas of high gas-oil ratios and field ratios still average less than 400 cu. ft. per barrel.

Cogdell . . . Meanwhile, other major reserves were found on reef pinnacles elsewhere along the Scurry trend. At Cogdell, north of Kelly-Snyder, a cooperative pressure-maintenance program has been in progress for several years with beneficial results. Operators process nearly all of the produced gas at a field gasoline plant and return all available residue gas to the reservoir to maintain pressure.

Currently, Cogdell operators plan to unitize the field and are considering a full-scale water-injection program down the middle of the field utilizing the method employed at Salt Creek.

One of the larger and more prolific fields on the Scurry Trend, Cogdell has 320 wells on 13,720 acres with a maximum original oil column as much as 770 ft. above present well depths. After producing nearly 23 million barrels of oil, it is still producing more than 21,000 bbl. of oil per day.

Von Roeder . . . Latest reservoir site for water injection will be the north area of the Von Roeder Canyon reef field in Borden County. Amerada Pe-

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troleum Corp. is circulating unitization agreements among operators and royalty owners for signature. Amerada plans to inject water into this 6,835-ft.-deep reef. Pressures, initially 3,077 psia., have slumped nearly 250 psi., and water injection is expected to check this downward trend.

Sharon Ridge . . . This Canyon reef field lies along the main course of the Scurry reef southwest of the Diamond M area. Warren Petroleum Corp. is planning to unitize this 314-well area for pressure maintenance by water injection.

How About a "Deferred Production Agreement"

. . . to increase recovery in nonunitized fields

by Hulette F. Aby

IN states having no compulsory unitization law a "deferred production agreement" may point the way to a

Author is general counsel, Midstates Oil Corp., Tulsa.

solution of conservation problems in gas-cap-expansion reservoirs.

Shutting in the wells on leases lying entirely within the gas cap is often the most desirable procedure, but sometimes violates the property rights of the royalty owner. In such case the operator, under the deferred production agreement, would make to the royalty owner regular gas payments based on an engineering study of the reservoir. Complete title to the gas which would have normally been produced then would pass to the operator.

Typical problem . . . The observations following pertain to an undesirable situation which, too often, confronts the oil and gas producer. These facts are assumed: (1) the producing reservoir is of the gas-cap-expansion type, (2) the stratigraphic boundaries of the common source of supply are known within reasonable limits, (3) gas reserves have been ascertained by development of the gas-cap leases, (4) oil reserves on the periphery of the field can be estimated with reasonable accuracy, (5) lands of certain royalty owners lie only within the gas cap while lands of other royalty owners are entirely within the oil rim, (6) an MER for the reservoir has been established on a volumetric withdrawal basis, (7) the state has no compulsory unitization law and voluntary unitization cannot be accomplished, (8) one operator owns all of the leases involved.

If this common source of supply were embraced by a single lease there would be no operating problem regardless of the existence or nonexistence of adequate conservation laws. The prudent operator would shut in the gas-cap wells in order that there could be a full utilization of the gas in moving the maximum recoverable quantity of downstructure oil into the well bores in the oil rim. Two considerations would make this a sound method of operation: (1) reservoir energy would be maintained for a greater period of time resulting in the production of a larger quantity of oil and, (2) no waste of gas would occur for, it is assumed, the operator would process the gas and inject it into the reservoir for pressure-maintenance purposes.

However, in this particular field the operator faces a dilemma which re-

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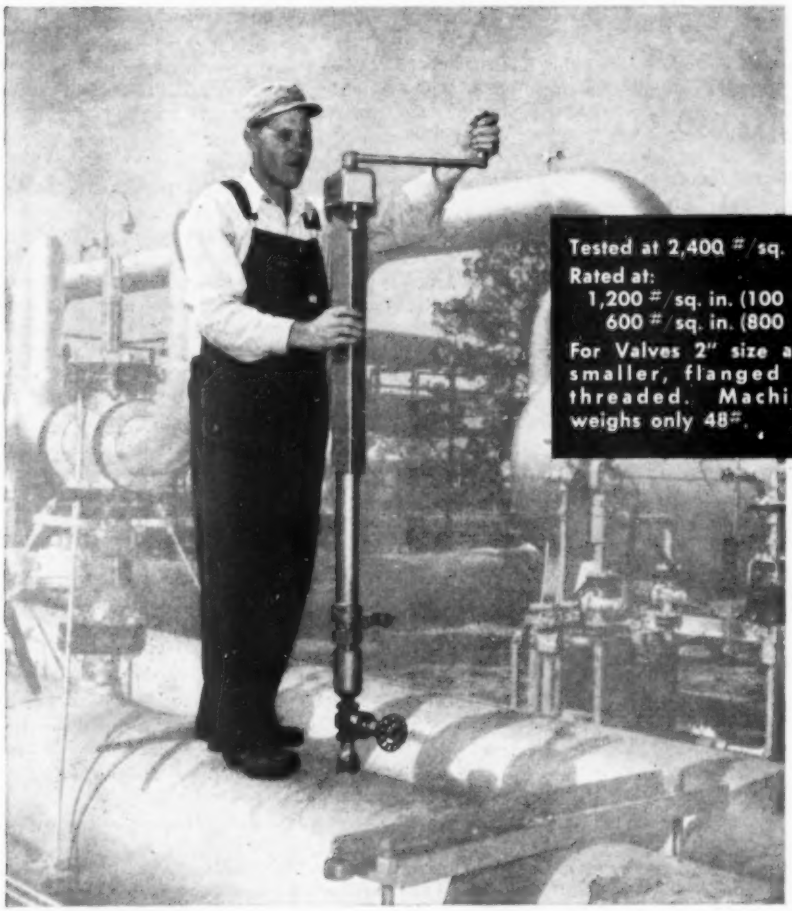

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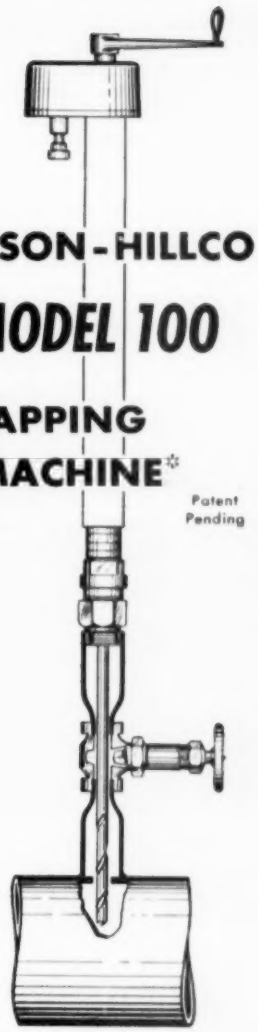

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sults from the diversified ownership of the separate minerals. The gas-cap wells cannot be shut in while the oil wells produce for this would constitute an unlawful confiscation of property. It is necessary then to preserve the property rights of the gas-cap royalty owners by permitting limited withdrawals of gas. Such withdrawals will produce only a small income but will cause great economic damage to the reservoir.

In this field, it is assumed, 1,000 M.c.f. of gas occupy an acre-foot of pore space while in the oil rim a like amount of space contains 750 bbl. of oil. Under the conditions stated, a 1,000 M.c.f. of gas will be sold for $100 but for each 1,000 M.c.f. of gas so withdrawn, 750 bbl. of oil, having a value of $2,137.50, will remain unproducible in the reservoir.

Form of Agreement

It is believed that this unsatisfactory situation might be overcome, while protecting the interests of the gas-cap royalty owners, by evolving a new type of agreement which—for lack of a better name—might be termed a "Deferred Production Contract." The agreement would have for its purpose the temporary shutting in of the gas-cap wells and, at the same time, provide the royalty owners affected with an income as though such wells were producing.

The agreement (with each separate group of gas-cap lessors) could take the following form:

1. Fix a gas reserve figure for the lease. Such agreement would be for a limited purpose as discussed more particularly hereinafter.

2. Provide that, upon the effective date of the agreement, the gas well will be shut in and production deferred thereafter until such time as the oil content of the reservoir is depleted. A "depletion date" probably should be established after giving full consideration to extrapolated production charts. Ideally, the parties could contract that the establishment of a depletion date would be within the sole discretion of the operator.

3. During each month of the deferred production period the operator would pay to the lessors, as royalty, a sum ascertained by multiplying the current selling price of gas by twice the number of cubic feet of royalty gas allowed to be produced under the MER. The operator would thereby gain title to such gas in place in the reservoir. It is suggested that the royalty would have to be paid on "twice the number of cubic feet of ——gas——" on the theory that limiting the royalty to the actual amount of MER production would not offer the royalty owners sufficient inducement to enter into the agreement.

Although the operator would thus be paying a double gas royalty, nevertheless the excess payment would be recovered from the proceeds of the additional oil made producible by the "in place" gas. Also it would be a reasonable probability that gas accounted for at 10 cents per M.c.f. in 1953 would have increased substantially in value at the time it was first produced, say 10 years hence. Title to such gas having passed to the operator, the enhanced price might, of itself, offset the double royalty paid.

4. The agreement should show specifically that payment of the royalty on the in-place gas would have the effect of maintaining the lease in force during the deferred production period.

5. The contemplated royalties would continue to be paid by the operator until (a) the end of the deferred production period, or (b) until that time when the operator has paid royalty on an amount of gas in place equal to the reserve figure for the lease, whichever date first occurs. From this it follows that an additional provision must be made to keep the lease in force after royalties have ceased. The parties could agree that during the interim following the deferred production period and

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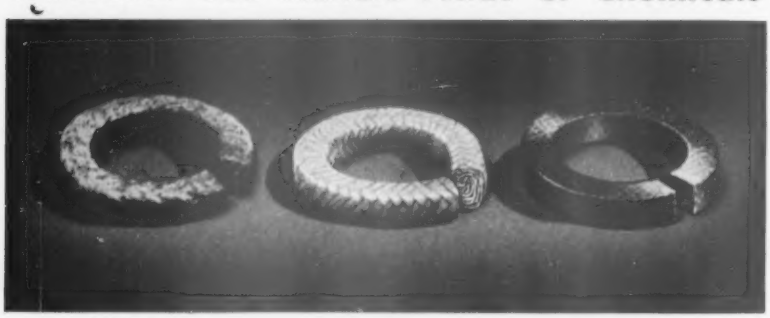

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JENKINS PRACTICAL PIPING LAYOUTS 70

How to plan an INDUSTRIAL WASTE TREATMENT SYSTEM

In many areas, stringent codes have been drawn up to regulate the types and condition of waste which may be discharged into streams and rivers, in order to conserve existing water supply sources.

Industrial discharges usually require chemical treatment, and one of the most common problems encountered is the neutralization of acid waste. In the system shown here, lime is used as the neutralizing agent. The waste normally flows to a digester which allows for settlement of solids and serves as a storage center. Flow from the digester to the treatment tank is regulated by a liquid level controller.

The treatment tank is equipped with an agitator which mixes the waste with the lime slurry to provide a neutral solution. The proportion of lime to be added is determined by a recording pH regulator, which operates the control valve on the slurry line and admits the required amount of slurry for neutralization. The slurry is made by admitting quicklime and water to the lime slurry mixer, which is equipped with an agitator. Emergency lines for direct discharge bypassing the treatment system are indicated in the diagram.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installation.

Diagram by Huxley Madeheim, Consulting Engineer

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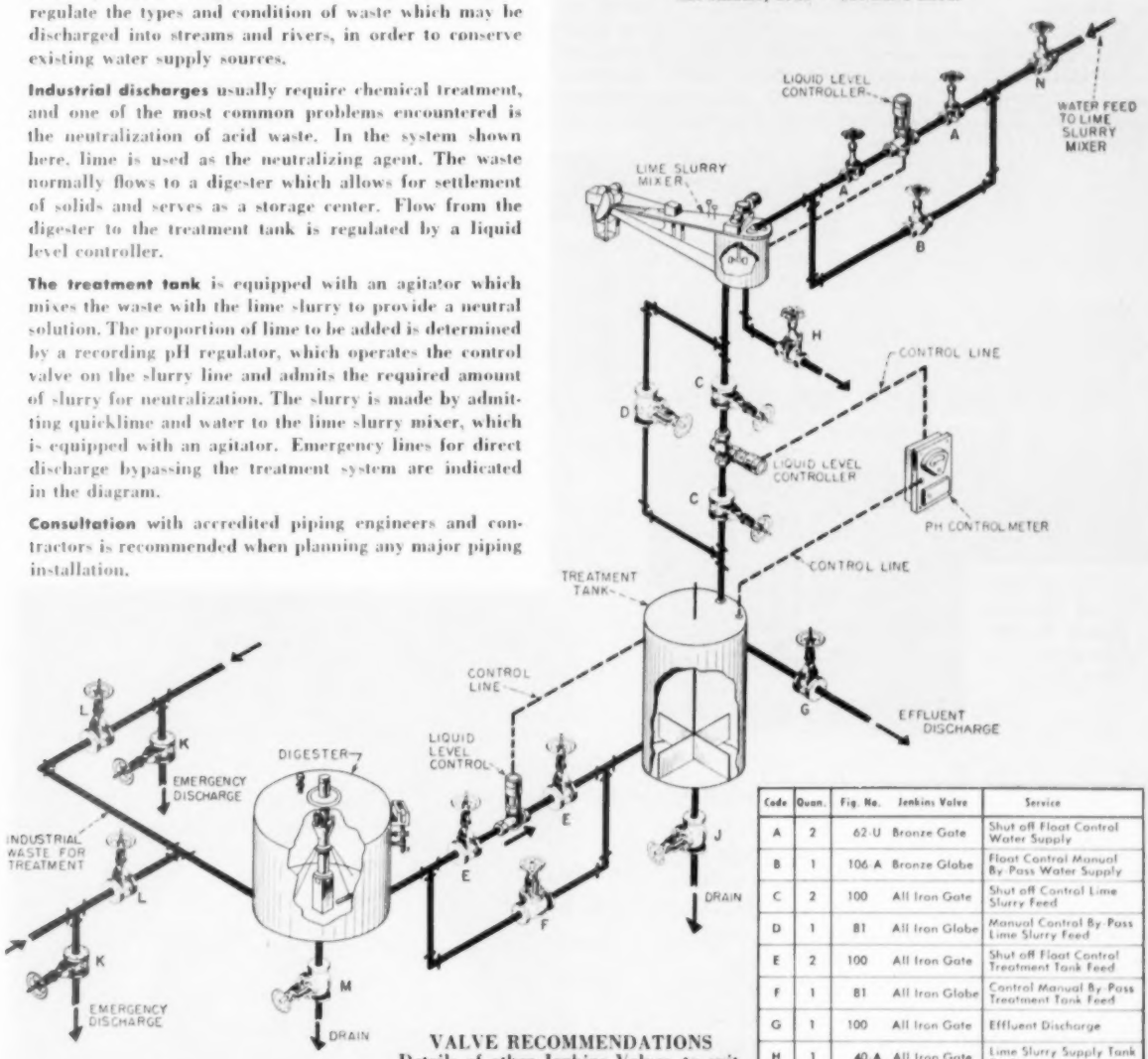

Code	Quan.	Fig. No.	Jenkins Valve	Service
A	2	62-U	Bronze Gate	Shut off Float Control Water Supply
B	1	106-A	Bronze Globe	Float Control Manual By-Pass Water Supply
C	2	100	All Iron Gate	Shut off Control Lime Slurry Feed
D	1	81	All Iron Globe	Manual Control By-Pass Lime Slurry Feed
E	2	100	All Iron Gate	Shut off Float Control Treatment Tank Feed
F	1	81	All Iron Globe	Control Manual By-Pass Treatment Tank Feed
G	1	100	All Iron Gate	Effluent Discharge
H	1	40-A	All Iron Gate	Lime Slurry Supply Tank Drain
J	1	81	All Iron Gate	Treatment Tank Drain
K	4	100	All Iron Gate	Emergency Waste Discharge
L	4	100	All Iron Gate	Shut off Waste Lines
M	1	81	All Iron Globe	Digester Drain

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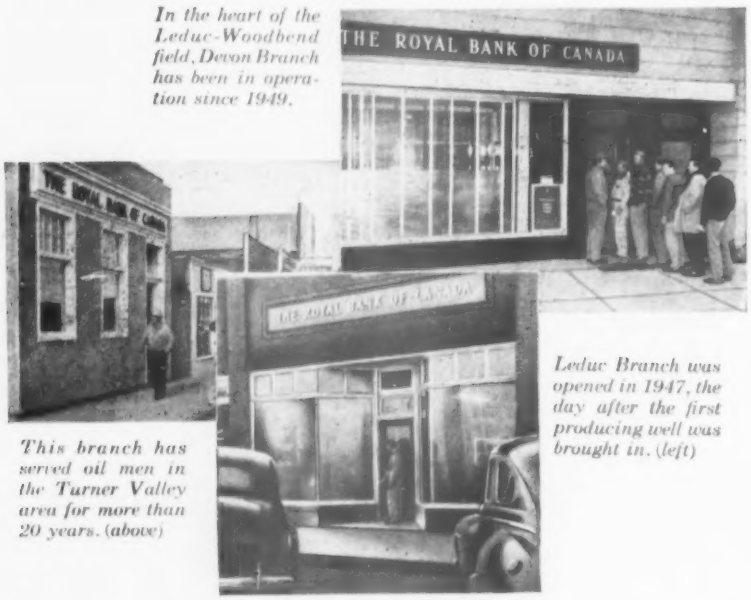
until such time as (a) the operator has produced from the well his in-place gas, or (b) the gas from the lease is exhausted, whichever first occurs, he shall pay to the royalty owners (quarterly or semiannually) in advance a stipulated sum which shall serve to keep the lease in force.

6. Upon the termination of the deferred production period production from the shut-in well would be resumed. Thereafter, all gas produced would be the property of the operator until such time as he recovers all of the gas on which royalty has been paid. If it is found that well is not capable of returning all of such gas to the operator, the deficit will be borne by him. If it is found that there is an excess quantity of gas underlying the lease, regular royalties shall be paid on all gas produced after the recovery by operator of all gas on which royalty has theretofore been paid.

7. An alternative method could be provided for the royalty accounting on the "in place" gas. A fixed price for gas would be agreed upon and during each month of the deferred production period the operator would pay the lessors a sum ascertained by multiplying one-eighth of the lease allowable by the fixed gas sales price. Thereafter, when the well went back on production, all royalty gas produced would be accounted for by paying to the royalty owners a sum equal to the actual sale price per M.c.f. of gas (as sold from month to month) minus the fixed price per M.c.f. of gas paid by operator during the deferred production period.

No doubt it would be well for the agreement to contain a provision providing for its termination, without further liability to either party, if, as and when the lease became a part of a field-wide unit pursuant to any pertinent state statute, subsequently enacted

In the heart of the Leduc-Woodbend field, Devon Branch has been in operation since 1949.



This branch has served oil men in the Turner Valley area for more than 20 years. (above)

Leduc Branch was opened in 1947, the day after the first producing well was brought in. (left)

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Canada's Expansion Has Been Spectacular

THE OIL AND GAS JOURNAL'S survey of Canadian operations reveals the great expansion which has taken place since Leduc and 1947. Information on each division is designated below.

Drilling contractors . . . In this division practically all of which is concentrated in the western one-half of the country, there are:

DRILLING DATA

Number of contractors	65
Number of rigs owned	244
Number of rigs running	157
Management personnel	134
Superintendents and tool pushers	234

The home-office distribution of the drilling contractors is:

City	Contr.	Rigs owned
Calgary	31	158
Edmonton	22	58
All others	12	28
Total	65	244

Producers and operators . . . Significant as to Canadian production is its tremendous potential compared to present production. The average sweep is very large. There are at least 500 identifiable companies which have production or extensive reservations of land to be developed. There are hundreds of subsidiaries for this original group of 500. Out of the whole group, over 250 companies actually have producing properties.

At present there are some 4,100 producing wells with a daily average of 262,000 bbl. of oil. There are 17 Canadian-owned companies accounting

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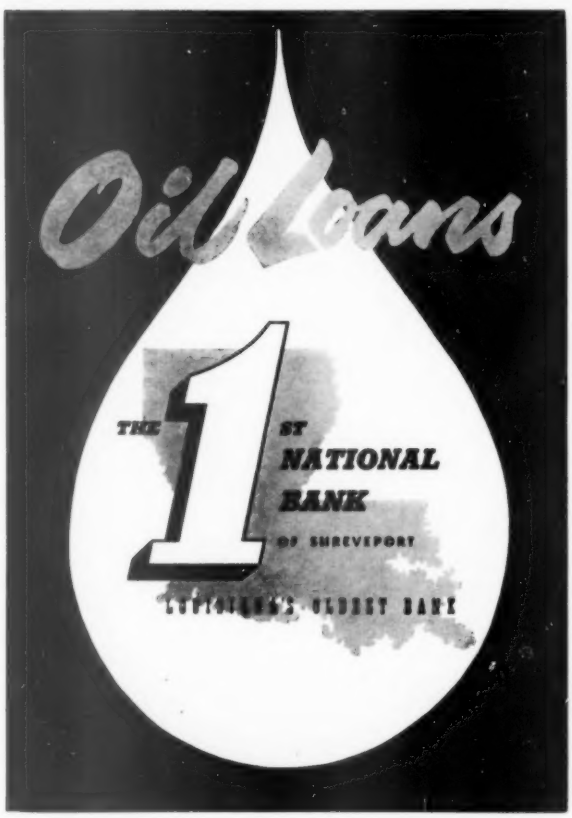

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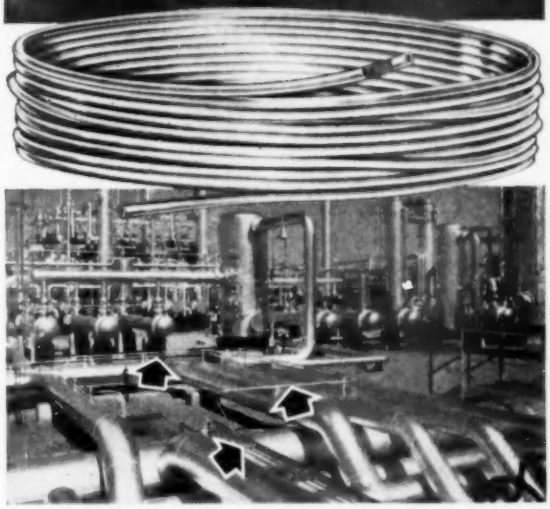

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- Fluids for hydraulic systems.

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Northwestern Utilities, Ltd. (457-mile gas line plus distribution lines)

Canadian Western Natural Gas Co., Ltd. (428-mile gas line plus distribution)

Montreal Pipe Line Co., Ltd. (products line from Montreal to U. S. border)

Valley Pipe Line Co., Ltd. (62-mile crude line plus gathering lines)

Canadian Gulf Pipe Line Co. (under construction)

Winnipeg Pipe Line Co. (75-mile products line)

The Imperial Pipe Line Co., Ltd. (about 250-mile gathering system).

Pipe-line contractors . . . There are 13 or more large pipe-line contractors working in Canada. Because of extreme weather conditions their work is seasonal and total employment fluctuates greatly. The companies are listed below:

Anderson International Constructors, Ltd.; Banister Construction, Ltd.; C. & S. Pipeline and Construction Co., Ltd.; Canadian Bechtel, Ltd.; Canadian Pipe Line Construction Co., Ltd.; Canadian Pipe Line Constructors, Ltd.; Comstock Midwestern, Ltd.; Hupp & Elliott Construction Co., Ltd.; Mannix, Ltd.; Piggott Construction Alberta, Ltd.; Preston-Clark, Ltd.; F. E. Shaw, Ltd.; Sparling-Davis Co., Ltd.; Williams Bros. Corporation Canada, Ltd.

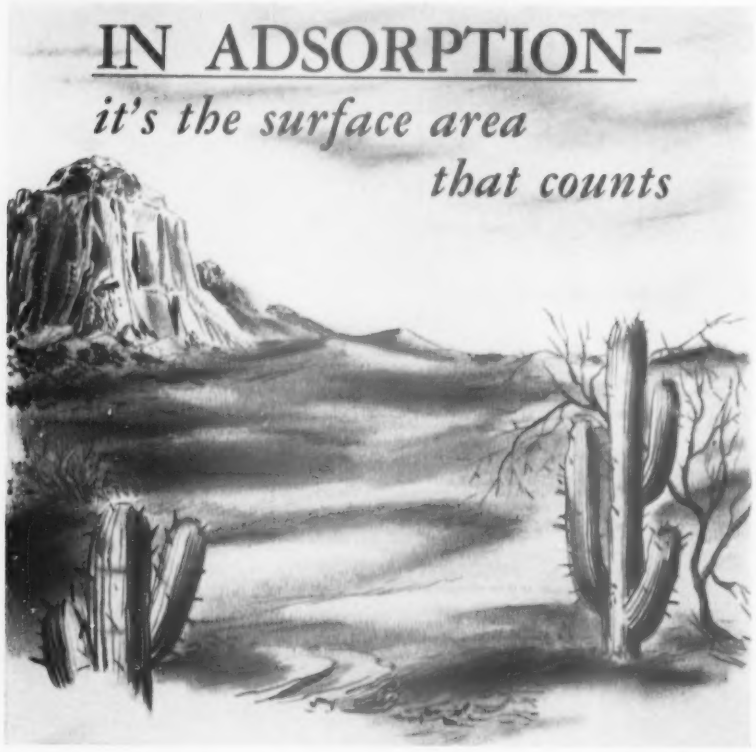
Refining . . . Thirty-nine refineries have a crude-oil charging capacity of 493,100 bbl. per stream day. There are about 10,400 total employes in this branch of the industry.

Drilling activity . . . Western Canadian drilling operations during 1953 as usual have been concentrated in Alberta, with Saskatchewan carrying along a full one-third as much drilling data for the five western oil provinces which are shown in the accompanying table.

NINE MONTHS 1953—JANUARY 1 TO SEPTEMBER 30

	Total wells	Footage drilled
Alberta:		
Field development	772	3,447,488
Exploration	285	1,284,351
Total	1,057	4,731,839
Saskatchewan:		
Field development	290	881,656
Exploration	182	757,805
Total	472	1,639,461
Manitoba:		
Field development	35	88,843
Exploration	17	53,791
Total	52	142,634
British Columbia:		
Field development	12	64,793
Exploration	17	100,454
Total	29	165,247
Northwest Territories:		
Field development		
Exploration	7	13,735
Total	7	13,735
Western Canada total:		
Field development	1,109	4,482,780
Exploration	508	2,210,136
Total W. Canada	1,617	6,692,916

There are 500 oil companies working in western Canada and many have contributed to the development of the Canadian oil industry. Government policy of reserving portions of leased lands which are later sold at auction has enabled many operators to enter fields discovered by others and, of course, participations and farmouts have been frequent.



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Florex is particularly superior in the adsorptive refining, decolorization, clarification and neutralization of mineral, vegetable, and animal oils, fats and waxes and for processes involving the use of highly active clay for sweetening light distillates, dehydrations, desulfurization, and polymerization.

Available in all standard particle sizes, special Florex meshes may also be ordered.

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"BUILT TO THE SAME SPECIFICATION STANDARDS – I THOUGHT ALL STEEL VALVES WERE ALIKE AS TWO PEAS"

OIC BUILDS FROM THAT POINT UP

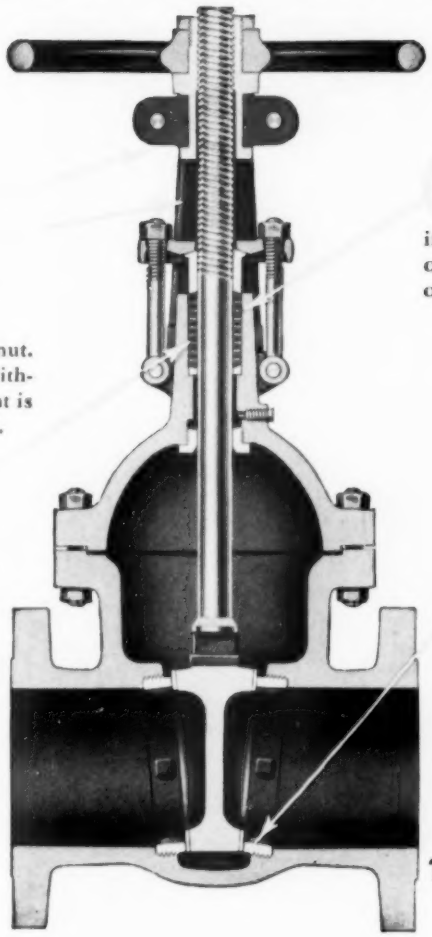
LOOK AT THESE FOUR FEATURES:

1 2-PIECE YOKE DESIGN

simplifies replacement of yoke nut. Permits replacement of yoke nut without shutting down the line. Yoke nut is OIC Alloy 40; non-galling material.

3 OIC'S SEAL-EVER PACKING

(exclusive with OIC) lasts 10 to 15 times longer than ordinary packing. It stops pitting and corrosion of stems.



2 STUFFING BOXES

have greater depth than is specified, permitting the use of 7 to 9 rings of packing, with either wiper rings or condensing chamber below.

4 SEAT RINGS

are end-seated and are subjected only to compression forces when valve is closed; no loosening of seat rings with repeated opening and closing of the valve. No open spaces to cause turbulence, accumulate dirt and hasten corrosion.

THE BEST STEEL VALVE YOU CAN BUY

This combination involving yoke design, stuffing boxes, packing and seat rings is evidence of OIC's desire to build *beyond* minimum specifications.

THE OHIO INJECTOR COMPANY, WADSWORTH, OHIO

OIC
FOUNDED 1881

VALVES

FORGED AND CAST STEEL · IRON · BRONZE

THERE'S AN
INSLEY
WORKING NEAR YOU

The Insley Line includes excavators and cranes, 5 to 30 ton capacity · rubber or crawler mounted · gasoline, diesel or electric powered. There's an Insley working near you on a pipeline project.

INSLEY MANUFACTURING CORP. · INDIANAPOLIS
wholly owned subsidiary
THE MAXI CORPORATION, LOS ANGELES

CANNON PLUGS

give exploration flexibility

...from the air
...on the ground
...under the sea

Modern science has given oil exploration operations a global scope. Probing for oil under mountains, deserts, oceans and jungles demands flexibility of equipment. Such flexibility is inherent in Cannon's vast line of electric connectors... the world's largest and most versatile line.

FOR AERIAL EXPLORATION

For aerial exploration with magnetometers and "flying laboratories" Cannon's K Series provides 3 basic shell designs 1 to 82 contacts and 204 contact layouts. Designed for aircraft uses, particularly on sensitive electronic equipment, Cannon's K Series play a vital role in the success of aerial oil exploration activities.

FOR SURFACE EXPLORATION

For surface exploration over all kinds of terrain and in all kinds of weather, Cannon's XK Series provides the required flexibility for seismometers, amplifiers and dynamic recording equipment. With strong zinc or steel shells, moisture resistant insulation and special Acme thread coupling, the XK Series is well adapted to geophysical exploration.

FOR UNDERWATER EXPLORATION

For handling seismographic circuits under water, Cannon's W Series offers 4 shell designs, from 1 to 52 contacts and 53 layout variations. Featuring heavy brass shells, and special sealing rings, Cannon's Waterproof Connectors perform without fail under the most rugged service conditions.

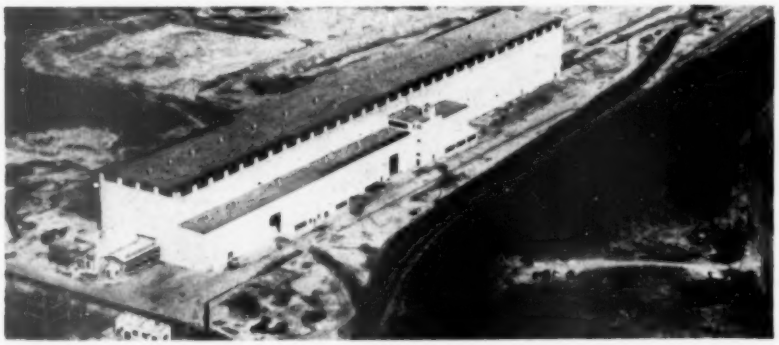
CANNON ELECTRIC

Since 1915

CANNON ELECTRIC CO., LOS ANGELES 31, CALIF.
Factories in Los Angeles, Toronto, New Haven. Representatives in principal cities. Address inquiries to Cannon Electric Co., Dept. L-164, Los Angeles 31, California.

EQUIPMENT MEN . . . in the News

Foster Wheeler Completing Modern Plant



Foster Wheeler's main building is 75 ft. in height, with 50-ft. clearance under the hooks of the 150, 50, and 40-ton cranes in the main bay. The three cranes in the main bay have a span of 90 ft., the full width of the bay, and one 25-ton, 30-ft. crane serves a side bay.

By the first of the year, Foster Wheeler Corp. expects to be in full operation in a new 5-million-dollar plant at Mountaintop, near Wilkes-Barre, Pa. The new plant, equipped with the most modern fabrication tools, will turn out pressure vessels of various sizes, including some of the largest and heaviest in demand.

The plant is equipped with the largest press of its type ever made, an 8,000-ton hydraulic beam unit weighing over 3 million pounds and capable of bending steel plate 8 in. in thickness. It can press lighter plate, 40 ft. long, into half-shells, for welding into unusually large high-pressure vessels.

The first application of supervoltage X-ray in private industry will be available with a 2-million-volt Van de Graaff X-ray generator, capable of penetrating steel 12 in. thick. This instrument, to be housed in a separate building with concrete walls 4 ft. thick, will require considerably less time than conventional X-ray equipment for photographing weld metal.

Other features of the new plant include a new system of automatic shielded arc welding for vessels up to 8 in. thick and 12 ft. in diameter, a series of high-speed radial drills that may be stationed anywhere along a 230-ft. stretch of raised track, and preheating, shot cleaning, and stress-relieving facilities.

Opens New Orleans Plant

Southern Engine & Pump Co. has announced the opening of its new offices with warehouse and shop facilities on Central Avenue, New Orleans. The company is a distributor for Le-Roi engines and related equipment.

Cheyney Elected Vice President of Sales

Charles C. Cheyney, a director and sales manager of Buffalo Forge Co., was elected vice president of sales and engineering by directors of the company.

Cheyney, a graduate of Cornell Engineering School, spent several years in the Buffalo engineering department. He was later transferred to Chicago as manager of the sales engineering firm of Cheyney & Emmert.

He returned to Buffalo in 1928 and was made assistant sales manager. He became sales manager in 1945 and in 1949 was elected a director of the company.

New Headquarters of Bowen Co. of Texas

Here is the new headquarters office building of Bowen Co. of Texas, in Houston. The building occupies some 5,600 sq. ft., is constructed of masonry and steel with tile floors, paneling motifs, and is air conditioned throughout. It is directly adjacent to recently expanded machine shops and is provided with employe and customer parking space. The Bowen Co. of Texas is a pioneer in fishing tool manufacture. It has grown in 19 years from a single small shop to a company of national distribution with 10 branches in centers of oil activity.

Chiksan Co. Holds Open House at Brea, Calif., Plant

Recently completed at Chiksan Co.'s plant in Brea, Calif., is this new air-conditioned building which increases office, warehouse, and assembly facilities.

Chiksan Co. held an open house recently for customers, suppliers, and the general public at the recently enlarged manufacturing plant in Brea, Calif. The major addition to the plant is a 28,000-sq.-ft. air-conditioned building with office area for the personnel, purchasing, production control, cost-accounting and cost-estimating, and sales-development departments. Shop administration offices and a large conference room are included in this area of the building.

The largest portion of this new structure is devoted to assembly, shipping, and warehousing operations and incorporates the most modern equipment

"STEADY CUSTOMERS in the Spindletop Field"—for JACKKNIFE Tuffy Rotary Lines

STANDARD
Tuffy Rotary Lines

Specially designed for use with standard rigs and for deeper drilling with jackknife rigs. Spools easily . . . delivers more ton miles before cutting is necessary.

Service Records of Tuffy
Praised by Tool Pusher with Leading Oil Company in Texas

"Now on the third Tuffy Jackknife line . . . looks like we have a steady customer here," reads a field report on one of the leading oil companies in the Spindletop field. (name on request)

Another victory for the extra toughness and flexibility of Tuffy Jackknife Rotary Lines. And as more and more tool pushers are switching to Tuffy, they are finding they get more ton miles of service, greater economy because of Tuffy's specially designed construction.

Why not switch to Tuffy Rotary Lines on your next job? See how its higher resistance to abrasion, shock loads, drum crushing and internal friction can help you cut rope costs, possibly up to 50%!

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Here's the Quick Easy Way to Figure Cut-Off Time!

Send for your FREE Union Wire TON MILE INDICATOR

Drillers everywhere are using this handy Union Wire Ton Mile Indicator to get better rope performance and lower wire rope costs. They find that by measuring the work their lines are doing, they avoid wasting rope by cutting too soon or too frequently. And they avoid many line breaks and costly fishing jobs caused by overloading.

Get your FREE Union Wire Ton Mile Indicator and Log Book and use it on your present job. All you do is set the figures from your well log book on the indicator and read the answer. You'll be amazed how much time and costs it can save you!

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Tuffy ROTARY LINES

Are Easy to Order

No complicated specifications to remember when you order Tuffy Rotary Lines. Just specify the length, size and Tuffy *Jackknife* or *Standard*.

Now! Get Your NEW FREE Well-Drilling Hand Book

Prepared by experts! Widely acclaimed by rig owners and operators everywhere! "Handbook of Wire Rope for Well Drilling" gives you latest, complete factual information, graphically illustrated, to help you cut rope costs. Read all the facts on:

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- Standard & Jackknife Rotary Lines
- Improving Ton Mile Service
- Cut-Off Procedures
- Servicing Drilled Wells
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CAMPBELL CHAIN

Makers of Famous *Lug-Reinforced* TIRE CHAINS

available. An outdoor area in the plant is devoted to full-scale equipment including marine and barge hose, loading racks, rotary hose, and mud-mixing guns used by the engineering and sales departments for research and product development.

S. W. Parfet to Represent Oil Base, Inc., in Peru

Stanley Parfet (right) leaves San Pedro harbor bound for Lima, Peru, where he has established his own agency to represent Oil Base, Inc.'s, complete line of drilling muds and additives, and American Glycerine Section of E. I. du Pont de Nemours & Co. products used in well shooting. George Miller, president of Oil Base, Inc., wishes him a bon voyage.

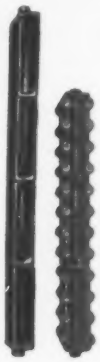
Stanley W. Parfet, formerly with E. I. du Pont de Nemours & Co., has established an oil-equipment supply and service company in Peru with headquarters at Lima. His South American associate is Guido De Rossi.

The new firm will represent Oil Base, Inc., Compton, Calif., manufacturers of Black Magic, White Magic, No-Glo, and other drilling fluids and additives for the petroleum industry. Some of the distinctive features of this new agency include a completely equipped mud-testing laboratory, expert field service, and product warehousing. Parfet and De Rossi will also sell and service for the American Glycerine Section of du Pont in Peru, handling products used in well shooting.

Colona Names Ricks As Mid-Continent Manager

Morgan Ricks has been appointed division manager of the Mid-Continent area for Colona Manufacturing Division, Pittsburgh Screw & Bolt Corp. He will make his new headquarters in Tulsa.

Ricks, who has been associated in a sales capacity with Pittsburgh Screw & Bolt for the past 15 years, had been district manager of the Louisiana division, with offices in Baton Rouge. In



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Fastest CLEANER BRITEWAY LIQUID

This "built soap", with its water softeners and conditioners, cuts grease in a jiffy—loosens and removes dirt at a record pace. Of course, its energy has been tamed so that it is safe.

Dissolves instantly, even in cold water, in economical solution, making an aromatic, sudsy mixture ideal for standard types of flooring, walls, woodwork, windows, tile, porcelain, glass stone—and thousands of other things.

BRITEWAY is the RIGHTWAY to clean

FOR
FREE SANITARY SURVEY
OF YOUR PREMISES
SEE YOUR DOLGE SERVICE MAN

experimentals
DOLGE
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the *FIRST* scratcher

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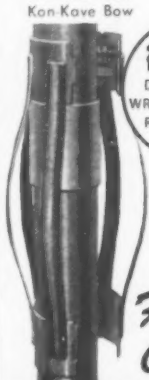
B and W Latch-On Centralizer with the New Kon-Kave Bow



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PROOF

HERE'S HOW TAPECOAT® HAS STOOD THE TEST OF TIME TO SOLVE CORROSION PROBLEMS

PROOF (Underground) — Inspection of TAPECOATED joints after 10 years of underground service showed no sign of corrosion when the TAPECOAT was removed.

PROOF (Alternate wetting and drying) — Expense and trouble in protecting lines subject to wet and dry conditions at cooling towers have been eliminated since 1944 by coating with TAPECOAT.

PROOF (Underwater)—During the re-laying of an underwater pipe line in the Gulf area, examination showed that TAPECOAT had protected the pipe against salt water corrosion and barnacles.

PROOF (Above ground)—A gas line at a bridge crossing was TAPECOAT-protected in 1944. There has been no need for attention and no interruption of service since the pipe was TAPECOATED.

Actual experiences like these show what TAPECOAT coal tar protection can do for you.

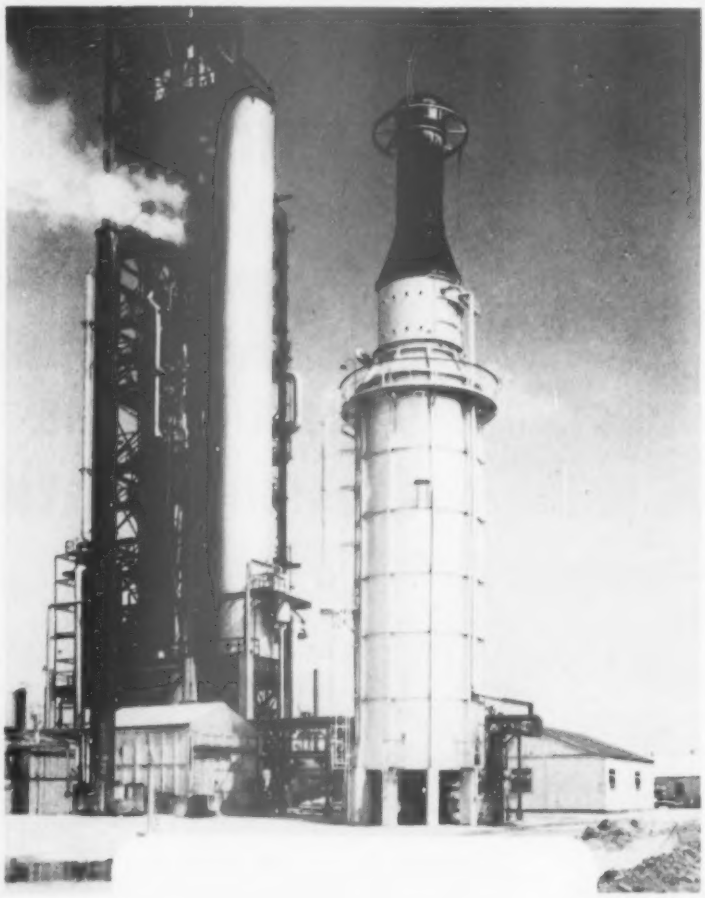
Use TAPECOAT to combat corrosion above or below ground on gathering lines, transmission lines, meter stations, compressor stations, distribution lines, pipe joints, bolt-type couplings, fittings, large bends, large diameter pipe, insulated lines, tanks, and other surfaces subject to corrosion.

Write for descriptive brochure and prices

The TAPECOAT Company

Originators of Coal Tar Tape Protection

1539 Lyons Street, Evanston, Illinois



TO THE PEOPLE OF THE

CHEMICAL-PETROLEUM INDUSTRY

Seasons Greetings and best wishes throughout the coming year

CHEMICAL-PETROLEUM DIVISION

NATIONAL AIROIL BURNER CO., INC.

PHILADELPHIA · PENNSYLVANIA

HOUSTON · TEXAS

his new position, he will have responsibility for Mid-Continent United States and Mid-Continent Canada as far north as Edmonton, Alta.

Ricks is a graduate of Texas A. & M. College, with a degree in engineering.

G.S.I. International Elects Moore President

C. M. MOORE, JR.

Promotion of Charles M. Moore, Jr., from vice president and manager to president of Geophysical Service International Corp., Calgary, Alta., has been announced by the company's board of directors. The promotion was made effective November 1. Promotion of F. J. Agnich from president to chairman of the board was also made effective on that date.

The Canadian geophysical company is an affiliate of Geophysical Service, Inc., Dallas. Moore joined the staff of G.S.I. in 1934 and has served as party chief, supervisor, and division manager of the G.S.I. Canadian division. With formation of Geophysical Service International Corp. in 1952, he was appointed vice president and manager. A native of Dallas, Moore has resided in Canada since 1946.

Wolverine Names Powell As Sales Representative

PHIL POWELL

C. T. Fuller, Southwestern district sales manager of Wolverine Tube Division of Calumet & Hecla, Inc., has announced the appointment of Phil Powell as sale representative.

Powell was formerly with Standard Brass Co., of Houston, as a representative specializing in condenser-tube sales. He is a veteran of 15 years' experience in the brass industry. He will headquarter in the Southwestern district office at Houston.

Lell Named Sales Manager For Wall Colmonoy Crop.

Appointment of Elmer J. Lell as sales manager for Wall Colmonoy Corp. has been announced by William P. Clark, vice president.

Lell joined Wall Colmonoy in 1948

Mister . . . this proves it . . . a better Wire Rope has been built!

J&L SPRINGKORE
a new type drilling line

Here's what it gives You

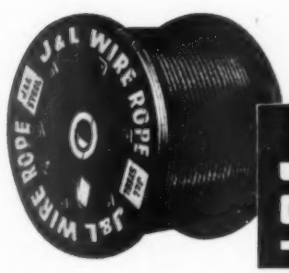
1. **Greater flexibility**
2. **Greater resistance to crushing**
3. **Economy**

Your First order will prove it

Here's why J&L SPRINGKORE does a better job for you

J&L SpringKore Drilling Lines are just what the name implies —a new type of wire rope in which the center of the rope is made of tightly coiled, high quality steel spring instead of an independent wire rope or fiber core. The outer strands of the rope are laid up in the regular J&L rotary drilling line constructions. This new J&L invention makes possible a flexible wire rope, yet provides a strong uniform support for outside strands against all the crushing action a rotary line receives. And, with all its advantages, you pay no more for SpringKore. Although it's a premium product, there is no increase in price.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH



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Now that you know about J & L SPRINGKORE . . . *let's get together!*

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416 Gateway Center, Pittsburgh 30, Pa.
I'd like to have more information on J&L SPRINGKORE DRILLING LINES.

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Small Valves?

HOKE

FLUID CONTROL SPECIALISTS

can solve your problem with all types and sizes

• **Standard Types** • **Special Designs** *for high vacuum conditions, high pressure conditions and corrosive fluids*

TEST & LABORATORY EQUIPMENT Needle valves with chrome or nickel finish; quick-opening valves for stopcock service; ball-type check valves in brass and stainless steel; high vacuum valves in toggle style, packless and needle types.

CORROSIVE FLUIDS Needle valves and toggle valves in several types of stainless steel; needle valves made from other alloys: aluminum, Monel, carbon steel; packless valves of diaphragm and bellows types, in several alloys.

INSTRUMENT AIR LINES Needle valves for direct panel mounting; toggle valves for on-off service with colored plastic handles for quick identification; valves for use with all types of tube fittings.

SPECIAL DESIGNS In many cases, our engineers can adapt standard valves to equipment manufacturers' special requirements.

Write for the New Hoke Catalog!

This completely illustrated 68 page catalog contains specifications on needle valves of all sizes as well as toggle valves, packless valves, special purpose valves, fittings and accessories. Tell us about your problem and we will gladly send you a copy of the catalog with our specific recommendations.

Address your request to 163 S. Dean St.

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HOKE INCORPORATED

Fluid Control Specialists

ENGLEWOOD, NEW JERSEY

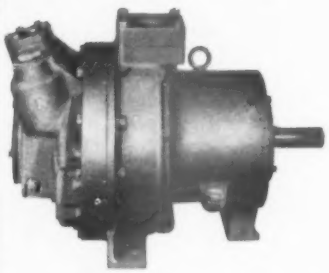
For **QUALITY**

Specify

PYLE-NATIONAL

Turbines

¼ to 120 h.p.



The Pyle-National line of highly efficient impulse type turbines is ideal for prime movers and standby drives on pumps, generators and other equipment in refineries . . . also for drilling site equipment such as shale shakers, pumps, bug blowers, generators, etc.

Since 1897 Pyle-National has manufactured their turbines entirely within their own plant . . . thus assuring positive control of quality and workmanship through all stages of production . . . from raw material to the final testing.

SEND NOW FOR BULLETINS

containing complete information on these small and medium capacity turbines.

TURBO-GENERATORS

Also available is bulletin on Pyle-National turbo-generators (500 to 15000 watts).

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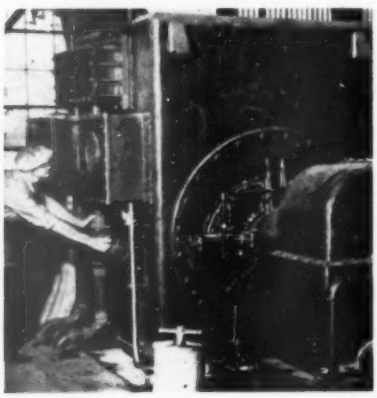
District Offices and Representatives in Principal Cities of the United States

EXPLOSION PROOF FITTINGS • FLOODLIGHTS

as Midwest sales engineer. He was named branch manager of the company's Houston office in 1950. He returned to the Detroit office in 1951 and served successively as sales engineer and assistant sales manager prior to his new appointment. Wall Colmonoy manufacturers hard-facing and corrosion-resistant alloys and equipment.

Large Specialized Motor Used in Esso Plant



The world's largest totally enclosed gas-filled induction motor is shown driving a centrifugal compressor in the recently dedicated 24,000-bbl. daily fluid catalytic cracking plant of the Esso Standard Oil Co. at Everett, Mass. Built by General Electric Co.'s medium induction motor department, the 14-ton electrical giant is rated at 3,000 hp., 1,800 r.p.m., 2,300 volt, 3-phase. Instrument air in the motor, kept slightly above atmospheric pressure, insures against explosive gases entering the enclosure, according to G.E. engineers. The new Esso plant is reported to be the first catalytic refinery in New England.

Bovaird Supply Reelects Officers and Directors

A successful year in 1953 and an optimistic outlook for 1954 were reported by senior officers at the recently held annual stockholders and directors meetings of Bovaird Supply Co. All officers and directors of the company were reelected.

The officers reelected were: D. D. Bovaird, president; Frank D. Bovaird, executive vice president; Roscoe G. Ayers, vice president and general manager of sales; R. E. Batchelor, general manager of stores; William J. Bovaird, assistant general manager of stores; R. M. McMahan, secretary; M. B. Park, assistant secretary; T. H. Trower, treasurer.

Directors include: D. D. Bovaird, Frank D. Bovaird, R. G. Ayers, R. E. Batchelor, and R. M. McMahan, all of Tulsa, and A. E. Booth of Bradford, Pa.

The company has recently opened a

THERE'S ALWAYS A LEADER

In Canadian oil — it's The Canadian Bank of Commerce, one of the world's largest banks.

More than 140 of our branches are strategically located in the sedimentary basin of Alberta and Saskatchewan alone. Our specialized Petroleum and Natural Gas Division, at Calgary, is staffed with men who know oil and the Canadian oil and petrochemical industries. They talk the oil man's language.

You are invited to use the complete, on-the-spot banking service we provide, to meet your own particular requirements in Canada.

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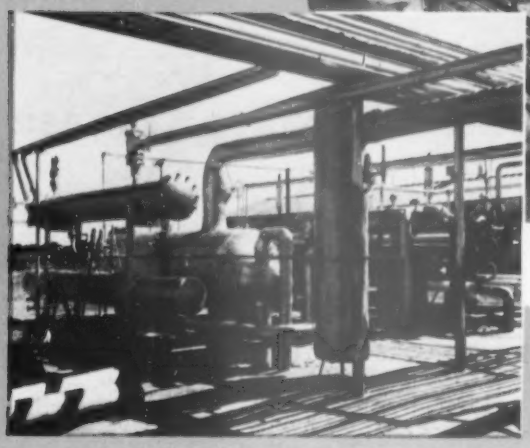
COLD

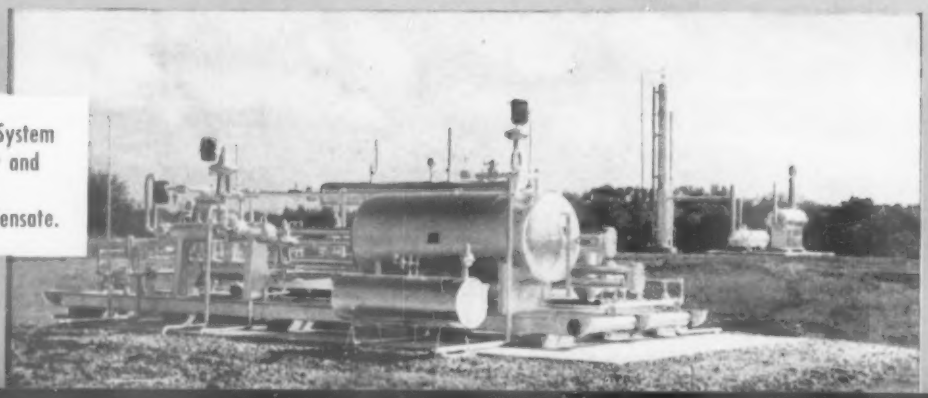
BS&B "COLD-FRAC"* System With Mechanical Refrigeration, Producing Natural Gasoline and LPG From Low Pressure Gas.



BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Division—Dept. 1-A12

1708 West Main Street — Oklahoma City, Oklahoma



BS&B "COLD-FRAC"* System With Hydrate Inhibitor and Natural Refrigeration, Producing Stable Condensate.

FRAC*

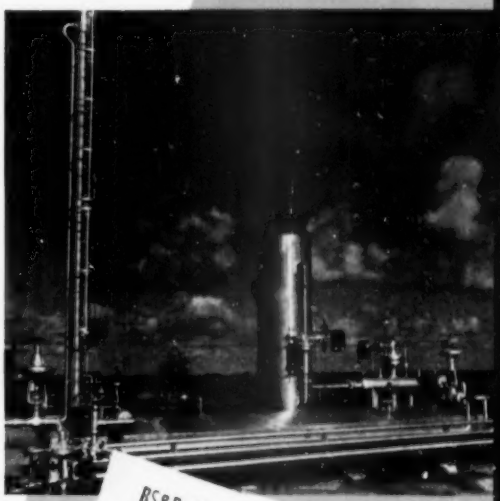
A NEW NAME

for BS&B's already well-known
LOW TEMPERATURE SEPARATION SYSTEMS

- **BS&B Conventional LTS System**
  (Without Hydrate Inhibitor)
- **BS&B Glycol Injection System**
  (With Hydrate Inhibitor)
- **BS&B Low Temperature Gasoline Plants**
  (With Natural or Mechanical Refrigeration)

BS&B's COLD-FRAC* Systems are respected among natural gas lease operators everywhere for their field-proven superiority in condensate recovery rates and their year-in and year-out reliability and performance under even the most adverse operating conditions. Available in a variety of types to handle whatever field requirements the operator may encounter.

The name to remember in Low Temperature Separation is — COLD-FRAC*! By BS&B.

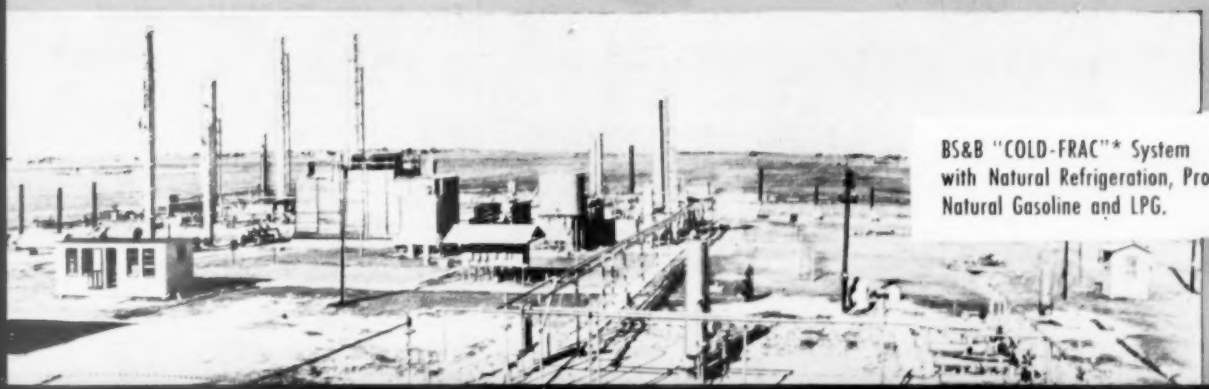


BS&B "COLD-FRAC"* System
Without Hydrate Inhibitor.
Uses Natural Refrigeration,
Produces Stable Condensate.

*"COLD-FRAC" is a trade-mark of Black, Sivalls & Bryson, Inc. (Patented and patents applied for).

LOW TEMPERATURE
BS&B
SEPARATION

COLD-FRAC* SYSTEM

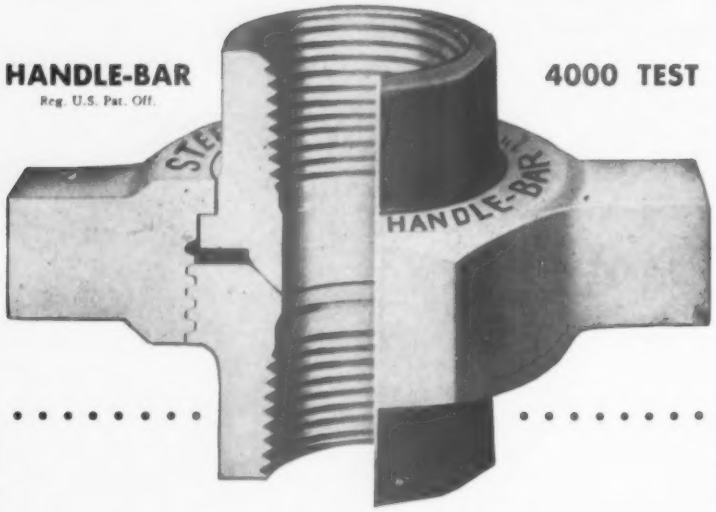


BS&B "COLD-FRAC"* System
with Natural Refrigeration, Producing
Natural Gasoline and LPG.

this will PLEASE you

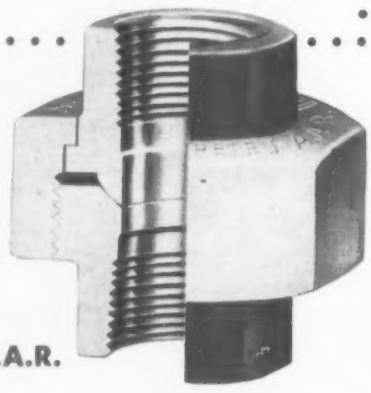
HANDLE-BAR
Reg. U.S. Pat. Off.

4000 TEST



The HANDLE-BAR 4000 Test forged steel union was the original quick type union and is the only volume-produced quick type union today. It has everything you want in a union—great strength, modified Acme nut threads and is precision finished—all of this at prices below any 1000 or 2000 Test quick type unions, even malleable iron. Specify HANDLE-BAR for real economy.

PETRO A.A.R. has everything you want in a steel union—great strength, weldability, A.A.R. interchangeability with other A.A.R. unions, perfect threads, machined and cold rolled female seat and permanently lubricated nut threads. 900 lbs. S.W.P., 3000 lbs. C.W.P. Sizes ½" Thru 3".



PETRO A.A.R.
Reg. U.S. Pat. Off.

For additional information about these and other Forged Steel Unions write Department O. for Illustrated Catalog or refer to listings in Composite Catalog pages 3194-3195, Refinery Catalog page 695 and Chemical Engineering Catalog pages 1294-1295.

ORDER BY TRADE NAME FROM YOUR LOCAL JOBBER

ORIGINATORS AND PIONEERS OF STEEL UNIONS SINCE 1912

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store at Lovington, N. M., and is expanding its offices and facilities at Tulsa.

Marlow Makes Hinnes Head Of New Department

Marlow Pumps, Ridgewood, N. J., has announced the appointment of Harold Hinnes as manager of the company's newly created service department. Reorganization of service facilities into a separate department will concentrate added attention on this phase of the company's business. The new department will act directly for dealers and customers to provide specialized attention to requests for parts, repairs, and service information.

Denison Sends Springer To West Coast Branch

W. SPRINGER

William D. Peters, manager of West Coast branch office of Denison Engineering Co., has announced the appointment of William Springer as direct factory representative headquartering at Los Angeles.

The Denison company, with headquarters and plant at Columbus, is a manufacturer of hydraulic pumps, presses, and controls for industrial, aircraft, and petroleum applications.

Springer goes to the Los Angeles office from the Denison plant where he has been connected with the sales department.

Mid-Continent Warehouse, Office Opened by Vickers

Vickers, Inc., manufacturers of hydraulic long-stroke oil-well pumping units, has opened an office at Odessa, Tex., to serve the Mid-Continent oil fields. The Odessa office will act as petroleum-equipment sales and service headquarters for the area, and will also maintain a stock of parts for Vickers pumping units to provide better service for its customers.

George W. Morte, who has been for the past 10 years with the West Coast headquarters of Vickers petroleum equipment department, has been appointed district manager, and will be

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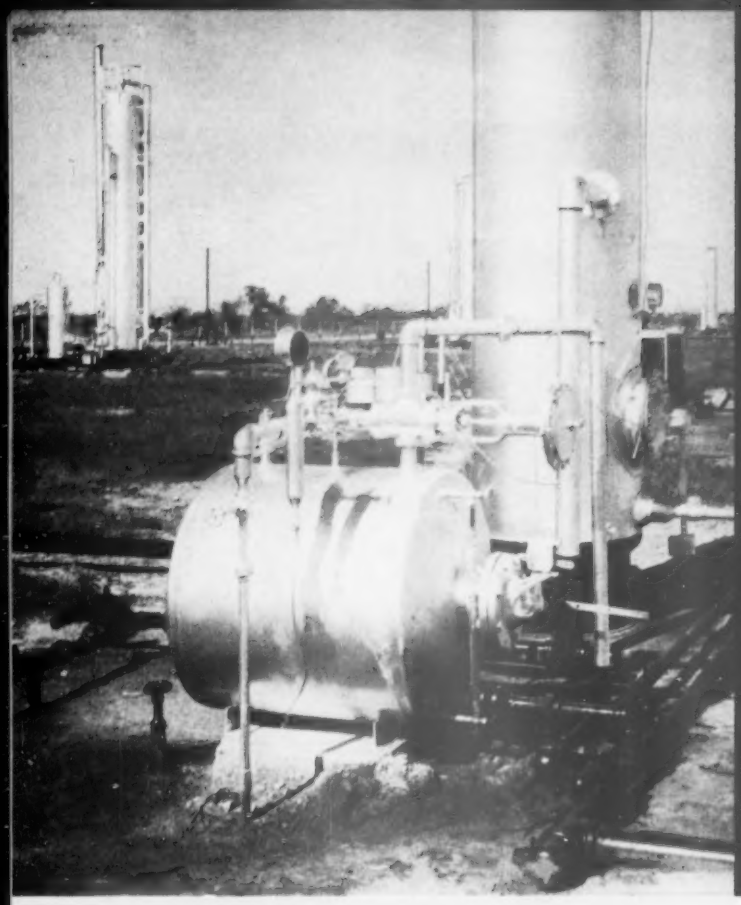

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NOTHING TO MIX

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BORASCU is applied dry — directly from sack to soil — prior to seasonal rains; becomes effective when dissolved and soaked into soil.

Just a man . . .
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. . . and BORASCU

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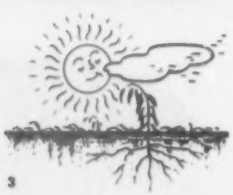
RAINFALL adds Borascu to soil solution; quickly carries it to all roots in control area.

NO MORE WEEDS



3

BORASCU in soil solution is taken up by plant roots to complete the killing process.

Here's real economy, practical as it is thrifty, for your "grassing" operations. Weeds can't grow in ground properly treated with BORASCU . . . areas remain bare one to two years after application! You can figure savings may total as much as 80% compared to old-fashioned hoeing methods . . . that's why BORASCU continues to be first choice with economy-minded production men in oil fields across this continent; from Canada to Venezuela . . . by major and independent operators alike. It is a granular material packed in easy-to-handle 100-lb. multi-wall paper bags. There is *no* risk with safe, non-poisonous, noncorrosive* and nonflammable BORASCU. Write for details today!

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DIVISION OF BORAX CONSOLIDATED LIMITED

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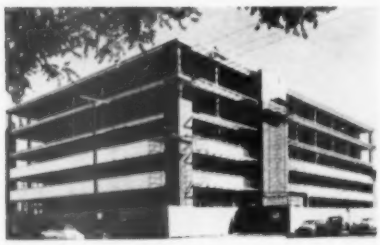
Borascu Field Men and Distributors are located throughout the Oil Fields of U.S.A., Canada, Mexico, Colombia, and Venezuela.

located at Odessa. He will be assisted by Edgar C. Swain, a sales and service engineer, who has also had a long background of experience with the Vickers units.

Vickers regional sales offices at Tulsa and Houston will continue to serve the Southwest on industrial, mobile, and marine applications of hydraulic equipment.

Stearns-Roger to Occupy New Building Soon



Stearns-Roger, of Denver, soon will occupy a new home-office building, which was engineered and constructed by its future occupant exactly to the requirements of a firm of engineering-constructors. Stearns-Roger is engaged primarily in the engineering, design, and construction of plants, and manufacture of specialized equipment for the oil and gas industry and chemical-processing plants. The building will have 90,000 sq. ft. of floor space and will provide facilities for Stearns-Roger home-office staff of more than 600 executives, engineers, designers, draftsmen, and general office personnel. Occupancy is scheduled for early spring of 1954.

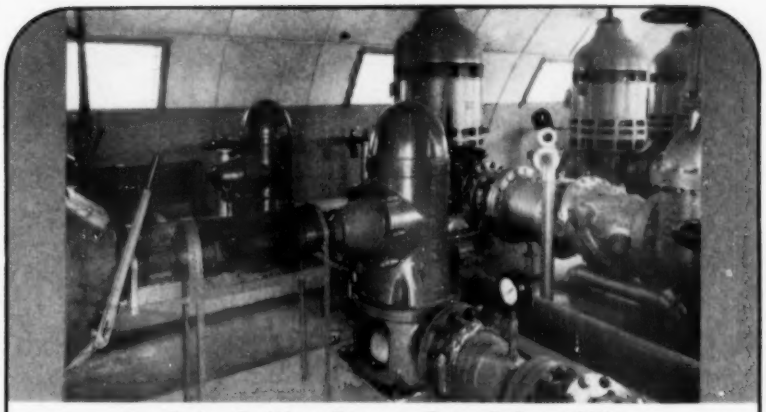
National to Start Work On New Gainesville Plant

Construction work on the new plant of The National Supply Co. at Gainesville, Tex., is expected to start in December. Operations on a limited basis are planned to start about September 1, 1954, and completion of the plant is scheduled for the end of 1954.

Brown & Root, Inc., engineers and constructors, of Houston, have been awarded the general contract for the construction of the plant. The cost of the plant and equipment, including the site, is estimated at $3,500,000.

Brown & Root has set up a field office at Gainesville. The 96-acre Gainesville site is the second largest of any National Supply plant, and affords room for considerable expansion. The company has six other plants. The largest, at Ambridge, Pa., occupies 115 acres. Other plants are at Etna, Pa.; Springfield and Toledo, Ohio; Houston, and Torrance, Calif.

Plans for the Gainesville plant call for a single-story manufacturing building, with more than 100,000 sq. ft. of space, and a separate one-story office building. The manufacturing building



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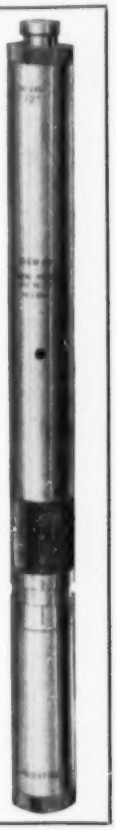

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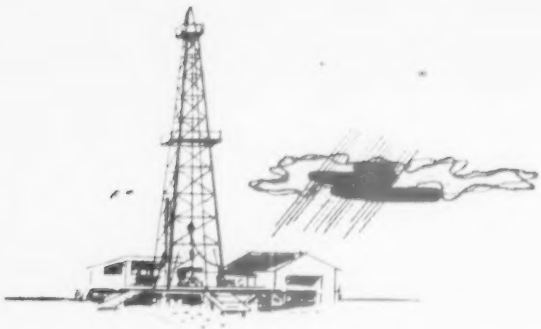

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ROLO No. 1H-3006-FWKO 30" O. D. x 5' s. to s. x 125 psi. w. p.

The Rolo No. 1H-3006-FWKO Wellchecker, shown above, was especially designed for testing in "water flood projects" and in fields where little or no gas is produced.

This Rolo Free Water Knockout Separator is available in a number of different sizes, with special built-in gas eliminator. Free water is removed from bottom of unit, oil from the top, and all gas is taken off from the special eliminator.

Wellchecker No. 1H-3006-FWKO has a rated liquid capacity of 900 BPD, with ten minute retention time.

Complete engineering services for every crude oil metering need. Consult us on your specific problems. Write today for illustrated catalog, with descriptions of all Wellchecker units, made ONLY by Rolo.

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will be served by its own railroad siding.

When completed, the plant is expected to employ 300 persons.

Republic Appoints Martin As Field Engineer

S. L. MARTIN

Stanley L. Martin has been appointed field engineer for the Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, Ohio, with headquarters in Houston. G. L. Smith, Republic's general sales manager, has announced. Martin will move to Houston where he will be responsible for contacting the rubber users in the southern part of Texas in the interests of Republic's line of belting, hose, and molded and extruded-rubber products. He has been with Republic in the home offices in Youngstown since July 1952.

Avondale Marine Ways Offers Monthly House Organ

Avondale Marine Ways, Inc., New Orleans, manufacturer of pressure vessels and piping systems, has announced a new house organ published for circulation to its clients. The new publication, entitled "Avondale Salutes," covers activity of the company, particularly as to application of its products in plant and field installations. It also includes items on company personnel and activity of its sales and installation staffs.

The firm invites all of those who are interested in receiving the booklet to request placement on the mailing list.

Home Federal Names Warren To Board of Directors

R. B. Warren, Jr., president of Warren - Bradshaw Exploration Co., has been appointed to the board of directors of Home Federal Savings & Loan Association, Tulsa, it has been announced by L. W. Grant, Sr., Home Federal president and board chairman.

Warren organized the company of which he is president in 1934. Its exploration, drilling, and production activities extend throughout Oklahoma, New Mexico, Kansas, and Texas.

On the board of Tulsa's 39-million-dollar savings and home financing association, Warren will join Chairman Grant, Harry Clarke, Robert Eakin,

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Use these famous Jimmie Gray Tool Joint and Drill Collar Compounds

You'll like this new Jimmie Gray Dope Brush, too!

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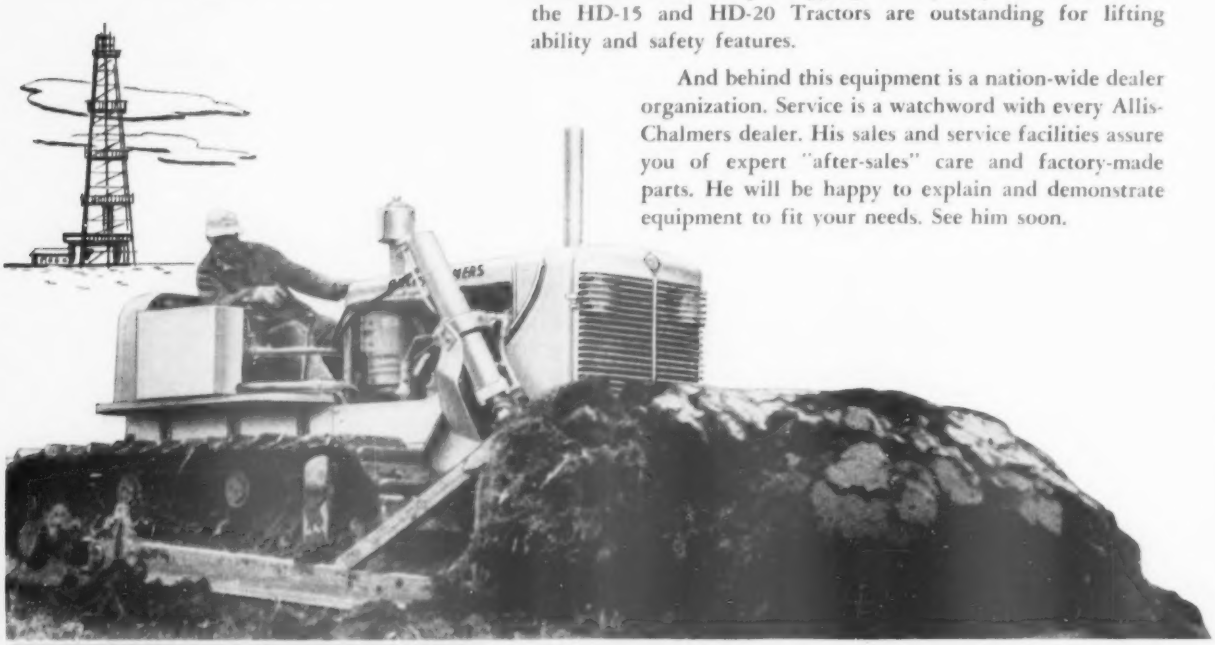
Big Producers on Oil Operations

Allis-Chalmers complete range of earth-moving and materials handling equipment — all designed and introduced in the past few years — is logging big work output and low maintenance figures for contractors, drillers, producers and refiners alike.

Four powerful crawler tractors, 50 to 175 hp. — all built new from the ground up to take on any and all types of dirt and terrain — provide a weight and horsepower range to cover every oil field need. Among the four Allis-Chalmers tandem drive motor graders — ranging from the big, new 104 hp. AD-40 to the efficient, low-cost 50 hp. Model D — you can be sure of exactly the right machine for your operations.

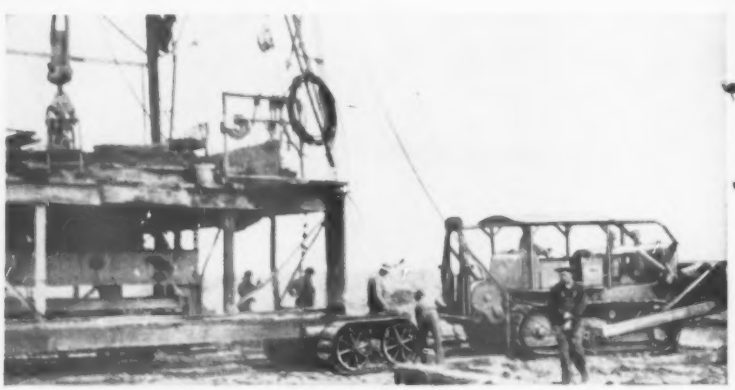
Matched, Allied equipment, too, is setting new standards in the industry. The new no push-beam type dozers are real timesavers on slush pit digging. Heavy-duty side booms for the HD-15 and HD-20 Tractors are outstanding for lifting ability and safety features.

And behind this equipment is a nation-wide dealer organization. Service is a watchword with every Allis-Chalmers dealer. His sales and service facilities assure you of expert "after-sales" care and factory-made parts. He will be happy to explain and demonstrate equipment to fit your needs. See him soon.



Here an HD-9 dozes out an access road on a new lease. Dozer output is speeded up by quick, easy, direct shifting from any forward speed to high reverse.

Slush pits are built deep, narrow — and in a hurry with this HD-9 Tractor and 9X no push-beam dozer. Blade is mounted directly on tractor main frame, providing steeper penetration angle, extra clearance, better balance, greatly increased track oscillation.



Drill rigs are skidded quickly, easily with this HD-15 doing the pulling. Positive seals on truck wheels, idlers and support rollers give sure protection from dirt, grime and moisture — require lubrication only once every *1,000 hours!*

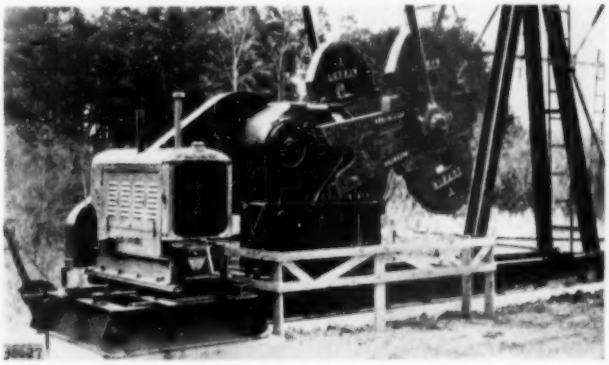
Side booms are finding more and more users in the oil fields. This HD-15 with side boom is placing pipe for a pumping plant. Great stability of tractor permits booming way out — hydraulically extendable counterweights provide maximum clearance on rough ground or in deep mud.

Here an AD-40 finishes right-of-way on a pipeline job. For building access roads, for tough grading, ditching, bank sloping, this big grader leads the parade. New hydraulic power steering provides extra ease of handling, yet retains the accuracy and "feel" of mechanical steering.

Stumps, brush, trees are rammed out in a hurry by this HD-15 clearing land for a drill site. Double reduction final drives and smooth, clean bottom construction give extra clearance when working in woods and on rough terrain.

Low-cost maintenance at its level best — that's this Model D motor grader — shown smoothing out grounds around a refinery. This machine — at one-third the cost of large graders — gives you tandem drive, power hydraulic lift controls, high arch type front axle, ROLL-AWAY* moldboard.

Here an HD-5G, one-yd. Tractor-Shovel loads gravel for road surfacing. Available for all four tractors, in one, two, three and four-yd. sizes respectively, these front-end shovels keep busy on dozens of jobs around lease and refinery.



It costs less to pump with Allis-Chalmers power units. One major oil company reports that a Model E engine ran 9 years and 10 months on round-the-clock service before an overhaul. Available in four sizes through Fred E. Cooper Inc., Allis-Chalmers power unit distributor to the oil industry.

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You can keep your pipe line rights-of-ways cleaned up, and spend less money doing it, with a Caldwell Rotary Brush Cutter. Our S-2 model's 57-inch spring steel blade will cut brush up to two inches thick, and better, in a single pass. Mechanized maintenance with a Caldwell Cutter is not only better and cheaper—it's quicker.

Quality features include Timken Tapered Roller Bearings, Alemite Fittings, Blood Bros. Universal Joint, standard Power Take-Off, Machine-cut Gears sealed in oil.

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STOP
Vapor Losses
with OCECO "Type B"
VENT UNITS

● Combined flame arrestor and conservation vent valve. These units protect both the tank and tank contents from entrance of flame; control and restrict tank breathing and prevent the free escape of vaporized liquids and lowering of gravity ratings. Sturdy, dependable, efficient and trouble-free Oceco construction. 2" to 10" sizes. *Write for Catalog 474-R. It gives full details.*

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Burtner Fleeger, Louis W. Grant, Jr., P. C. Lauinger, G. C. Parker, John Rogers, Ralph Talbot, and Bailie W. Vinson.

Wiggins to Represent Oakite in K. C. Area

G. R. Wiggins is now serving petroleum and railroad accounts in the Kansas City area for Oakite Products, Inc., manufacturers of industrial cleaning and related materials. Wiggins majored in chemical engineering at Transylvania University in Kentucky, and for the past 4 years has been the Kansas City representative of a large paper firm. He recently completed an intensive, 7-week training course at Oakite's New York headquarters and in the field.

Rockwell Names Sales Engineer for East Texas

J. N. Holland, Houston, has been appointed a sales engineer for the Meter and Valve Division of Rockwell Manufacturing Co. covering most of East Texas, according to J. H. Walters, Houston district manager.

Holland will take over much of the territory formerly handled by Kenneth Rembert in order to allow Rembert to spend additional time in the Port Arthur-Beaumont-Lake Charles area.

A 1951 graduate of Texas A. & M. College with a B. S. degree in industrial engineering, Holland joined Rockwell last April as a sales trainee.

Moore In New Job At Baker-Raulang Co.

The appointment of Russell A. Moore as field applications engineer, specializing in side-loading fork truck applications, has been announced recently by G. B. Davis, vice president of The Baker-Raulang Co.

According to the announcement, Moore will be available to analyze plant and yard layout as they apply to side-loader operation, and as a consultant on general materials handling problems.

Before joining Baker-Raulang, Moore was group engineer for Bell Aircraft Corp., and was responsible for design, fabrication, and testing of ground handling equipment used in the guided missile program. Prior to his work with Bell, he was chief engineer for Dusing & Hunt, Inc.

In making the announcement, Davis explained that Moore's wide experience with side-loading lift equipment gives him a solid background and knowledge which should be invaluable to industrial truck users.

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Ask him—he'll tell you Klein tools and equipment just can't be beat for service—for safety. Look for the familiar Klein trade-mark on pliers and climbers, safety straps and belts, lag wrenches and grips. It has been a trade-mark of quality . . . "Since 1857."

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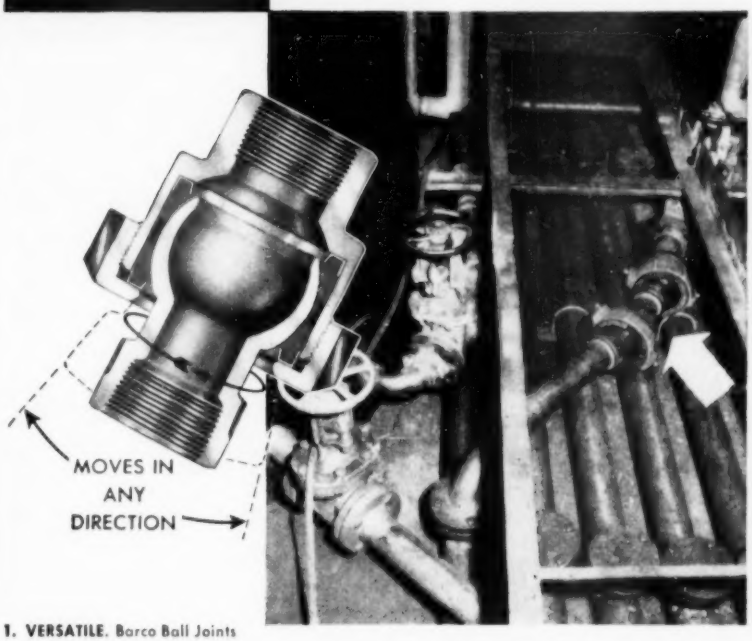
BARCO *Flexible* BALL JOINTS



1. **VERSATILE.** Barco Ball Joints solve many piping problems where flexible connections are needed to allow for movement, overcome misalignment, and guard piping against vibration, strain or shock.
2. **MAXIMUM FLEXIBILITY.** Up to 40° side flexibility with 360° rotating movement.
3. **MANY STYLES AVAILABLE.** Angle or straight; threaded or flanged connections. For pressures to 7,500 psi; temperatures to 1000° F. 15 different sizes, ¼" to 12".
4. **CHOICE OF MATERIALS.** Built to meet service requirements for steam, oil, gasoline, water, chemicals, and other fluids.
5. **ENGINEERING RECOMMENDATIONS.** Barco will be glad to send you complete information—ASK FOR BULLETIN No. 215.

For LUBE OIL TRANSFER LINES

■ The above photograph shows a series of manifolds which carry various types of lube oil. Note the diagonal line (arrow) fitted with two BARCO BALL JOINTS. The diagonal line is connected to a storage tank, and the blank flange on each manifold is so positioned that the line with the joints from the storage tank can be connected to any of the manifolds. This type of hook-up is used for a number of installations. At the location pictured here, the company has about 20 storage tanks in the group. The Barco Ball Joints are 3" Standard Series, Style 7-8.

As compared with conventional fixed piping, this type of hook-up eliminates a considerable number of valves, fittings, and pipe, and requires little space. Also, it is practically foolproof by giving visual indication of the manifold being used.

For complete information about Barco Ball Joints and how to use them, write to BARCO MFG. CO., 539N Hough St., Barrington, Illinois.

BARCO

THE ONLY TRULY COMPLETE LINE OF FLEXIBLE BALL, SWIVEL, SWING AND REVOLVING JOINTS

- Extreme Positive Penetration
- Larger Hole Diameter
- Reduced Clean-Out Time and Cost
- Fast Efficient Service by Experienced Welex Crews

Get BETTER Results In Open Hole Shooting

Use the Improved Welex Aluminum Type Torpedo Jet Gun

Now! The Welex CAST ALUMINUM type Torpedo Jet Carrier cuts clean-out time to a fraction of the previously required time. Upon detonation, both the charges and carrier in this gun assembly are broken into very small particles which can be left in the well bore or easily removed.

The Welex Method is the ONLY type of open hole shooting which provides both advantages of the deeper penetrating aluminum cased charges and the small expendable cast aluminum type carrier.

Look to Welex for the Latest and Best in Jet Perforating

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San Angelo • Shawnee • Stillwater • Victoria • Wichita Falls • Great Bend

Among the Drilling Contractors

Kirberger Joins Staff Of Service Drilling Co.

Appointment of R. Earl Kirberger to the position of assistant to management of Service Drilling Co., of Tulsa, and its affiliated companies has been announced by Ed A. Smith, president of these companies.

R. E. KIRBERGER

Kirberger has a comprehensive range of experience in machinery, equipment, and special services in oil country trade, having been associated with several of the larger local and national equipment manufacturers and organizations in both sales and service work, domestic and abroad.

Service Drilling Co.'s appointment of Kirberger is in line with this company's steadily expanding operations.

Loffland Brothers Co., Los Angeles and Tulsa, has a new deep test under way for Richfield Oil Corp. in the South Cuyama area, Santa Barbara County, California. The operation, listed as 1 Fisher, with location in 2-9-27, is the first started in the area in several months. Hole is projected to 10,000 ft. Location is ½ mile from projection.

Cable Tool & Rotary Drilling Co. has a new 7,800-ft. contract job under way for P. N. Wiggins, Jr., of Dallas, at a wildcat location 2 miles north of Hallsville, in Harrison County, northeastern Texas. Location is in the O.H.P. Survey.

Circle Drilling Co., Lake Charles, La., has taken on a contract for a projected 11,500-ft. wildcat test to be drilled for Bates & Cornell in Lafayette Parish, Coastal Louisiana. Location is approximately 3 miles west of Lafayette and about 6 miles south of Bosco. The test is listed as 1 Alcide Martin, in 35-9s-3e.

Crawford Drilling Co., Shreveport, has a contract with Texas Pacific Coal & Oil Co. for a 6,500-ft. test to be drilled at a wildcat location 3 miles northwest of Waynesboro, in Wayne County, southeastern Mississippi. Location is for 1 Busby, in 34-9n-7w. It is 3 miles from Yellow Creek field, nearest production.

Sunnyland Oil & Refining Co., Rayne, La., has a rig working for Humble Oil & Refining Co. on a new operation in Sibley field, Adams County, southeastern Mississippi. Location is at 9 Blake, projected to the field's Wilcox pay. Contract is for 6,800 ft.

Santa Maria Drilling Corp., Long Beach, Calif., is drilling on the first of two wildcat tests Richfield Oil Corp. has projected for the area between Russell Ranch and South Cuyama fields, in northeastern Santa Barbara County, California. Current operation is 88-10 Russell, in 10-10-27.

Carmack Drilling Co., Denver

CARMACK DRILLING CO., Denver, one of the newer drilling contracting firms in the Rocky Mountain region, not only has figured prominently in the active development which has been carried on in the West Sussex and Southwest Clareton areas of the Powder River basin, in northeastern Wyoming, but has done a substantial volume of exploratory drilling throughout Wyoming, Colorado, and Utah. Main office is in the C. A. Johnson building.

H. T. CARMACK

Organization . . . President and principal owner is Harold T. Carmack, who founded the firm in 1950. Prior to starting the firm, Carmack was associated with Loffland Brothers Co. as

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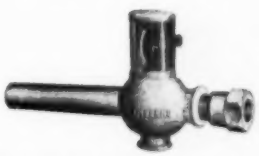

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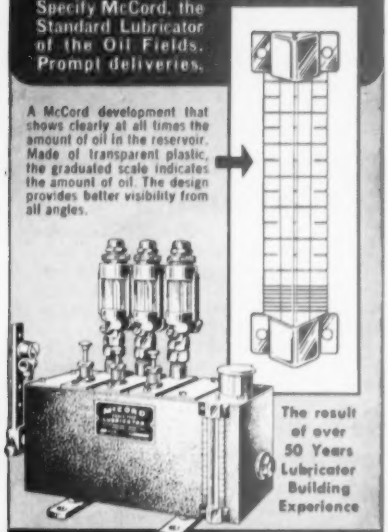

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superintendent of that company's Rocky Mountain operations. He has been active in the American Association of Oilwell Drilling Contractors, Rocky Mountain Oil & Gas Association, and American Petroleum Institute. O. C. Hork is office manager and accountant. Tool pushers are: M. J. Hunt, R. J. Carmack, and W. L. Stokes.

Equipment . . . The firm started business with one rotary rig, a Model 50-A assembly. Two additional rigs have been put in operation. One, a Model T-20, was acquired in 1951; the other, another Model 50-A, was obtained in June 1952.

Achievement . . . With one rig, the second, the company has drilled 15 wells so far this year. Thirteen of these wells were drilled to 3,000 ft., and two to 5,500 ft.

West Coast Contractor Drills Its 1,000th Well

Recent spudding of Standard Oil Co. of California's third directional well, 3-E State, at Montalvo, Calif., marked the starting of the 1,000th well to be drilled by Thomas P. Pike Drilling Co., of Los Angeles.

Starting business 15 years ago in 1938 with one rig, a small steam-powered assembly, this company has grown to be one of the larger contracting companies on the West Coast. Currently, it is operating 16 rotary rigs in all depth classifications.

During its past fiscal year it drilled 160 wells, totaling 762,530 ft., or 144.42 miles of hole.

Holmes Drilling Co., Houston, is contractor on a projected 9,250-ft. wildcat test Sun Oil Co. is starting at 1 Kuester, in the IRR Survey 11, 15½ miles north of Victoria, in Victoria County, South Texas.

ACTIVE ROTARY RIGS*

Area—	Week ended 12-14-53	Change week ended 12-7-53	Change week ended 12-15-52
Gulf Coast	607	+ 7	— 18
N. & W. Tex.-N. M.	878	— 2	— 1
Ark.-N. La.-E. Tex.	210	— 4	+ 64
Oklahoma	409	+24	+ 36
Kansas-S. Nebraska	173	+ 8	— 31
Illinois-Eastern	170	+ 5	+ 32
Rocky Mtn.	298	+ 8	+ 61
Pacific Coast	175	—12	— 4
Total U. S.	2,920	+34	+139
Western Canada	159	+ 1	— 22
Total	3,079	+35	+117

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, and the Gulf Coast and Arkansas-North Louisiana-East Texas areas are shown on pages 376 and 377.

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To help you determine the specific benefits of using Galvo-Pile for your cathodic protection assignments, call or write your nearest Dow sales office or authorized distributor. THE DOW CHEMICAL COMPANY, *Magnesium Department*, Midland, Michigan.

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PIPE LINE

New Plans Filed

T.G.T. refiles proposal for New York expansion

HOUSTON. — Tennessee Gas Transmission Co. here has refiled its application with the Federal Power Commission in Washington, D. C., requesting permission to build additional facilities to extend natural-gas service to the New York metropolitan area.

Under the new application, Tennessee would construct a 243-mile, 24-in. line from its Hebron, Pa., storage field eastward across Pennsylvania, New Jersey, and New York, to a point near Greenwich, Conn. Through a connection with this line at a point near White Plains, N. Y., and through a 28-mile, 24-in. spur line to Newark, N. J., the company would deliver 90,000,000 cu. ft. daily to its customers.

Over-all cost of the new facilities would be approximately $33,677,000, and completion date would be in the fall of 1955.

Gas needs cut . . . Under the original application filed with FPC in November *(The Oil and Gas Journal, November 16, page 187)* the company would have spent $45,000,000 expanding its system to raise delivery capacity to 2.1 billion cubic feet per day. This application was withdrawn 2 weeks later, however *(The Oil and Gas Journal, November 30, page 50)*, after Philadelphia Electric Co. said it wanted to buy only 10,000,000 cu. ft. of gas daily instead of the 30,000,000 cu. ft. daily originally anticipated.

Also on file before FPC is a proposal by Transcontinental Gas Pipe Line Corp., of Houston, seeking to expand natural-gas service to the New York metropolitan area by looping its existing 30-in. line and installing new compressor stations *(The Oil and Gas Journal, November 30, page 49)*.

Tennessee's new line . . . Under the new application, Tennessee's new 243-mile 24-in. line would run from the site of a previously authorized but yet-to-be-built compressor station in Hebron field to its eastern terminus. The total estimated cost of $33,677,000 does not include cost of constructing the authorized compressor station.

Storage plan renewed . . . Tennessee Gas also renewed an offer of an important new storage service on an option basis to its new customers in the New York area. Under this plan, they could deliver gas in off-peak periods to Tennessee Gas, which would store the fuel and redeliver it to the customers at times of heavy demand to avert cold-weather shortages.

The service would be provided from

Gulf Interstate Pushes Kentucky Right-of-Way Work

A bulldozer pulls a giant ripper across rugged Kentucky terrain preparing right-of-way for Gulf Interstate Gas Co.'s 860-mile, 30-in. natural-gas-transmission system. Upon completion late next year, the system, including over 300 miles of gathering lines, will extend from the Louisiana Gulf Coast below Lake Charles to Boyd County, Kentucky (H. C. Price Co. photo.)

See Composite and Refinery Catalogs, or Write for Folder On

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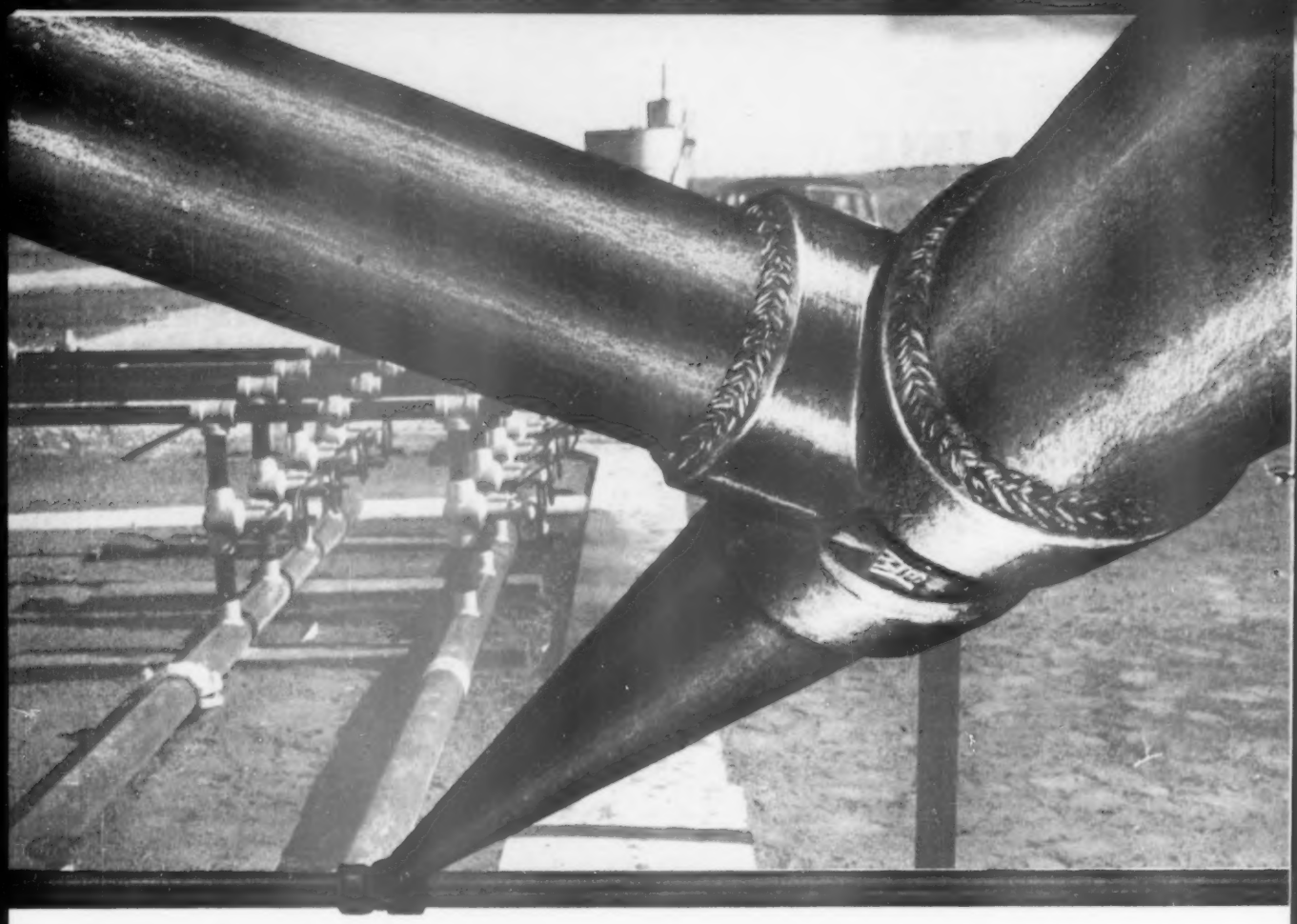

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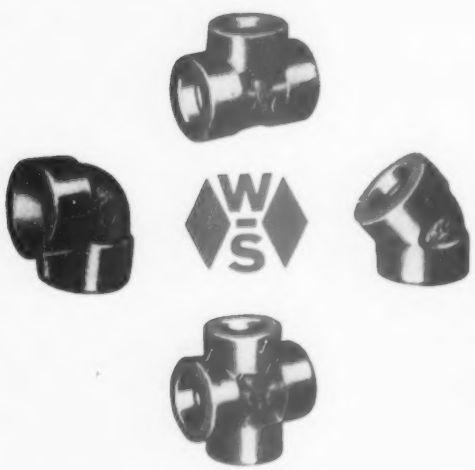

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PALO ALTO CALIF.

Tennessee's Hebron field, which is already being used, and from nearby Harrison field. Authority to acquire an interest in and develop the latter field is being sought in the second application.

Proposed construction would provide Tennessee with 36,000,000 cu. ft. per day unallocated capacity in the Hebron-Greenwich pipe line, which it plans to sell in the New York rate zone.

Pipe Liners Gain

Third quarter traffic, revenues show increase

WASHINGTON.—Third-quarter traffic and revenues of major oil pipeline companies were substantially above those of both the preceding quarter and the same quarter last year.

The seasonal upturn, however, was not as marked as it was in 1952, it was disclosed by reports filed with the Interstate Commerce Commission by 57 companies with operating revenues in excess of $500,000 a year.

The total volume of crude and products moving through the 57 systems was 919,074,036 bbl., compared with 874,650,895 bbl. in the preceding quarter. The increase of less than 44,500,000 bbl. contrasted with the 98,000,000 bbl. gain registered last year when the movement went from 742,265,764 bbl. in the second quarter to 840,683,883 bbl. in the third quarter.

Transportation revenue for the 1953 third quarter amounted to $140,019,621 compared with $134,306,358 in the second quarter. In the corresponding period last year it was $136,757,150 compared with $115,785,834.

Although the over-all totals increased in the third quarter, 22 companies reported less traffic and 25 showed a decline in revenues. For five companies no comparison was possible because they were not in operation or filing reports a year ago.

Leaders . . . The top five transporters were: Humble Pipe Line Co., 69,940,327 bbl. against 70,874,484 bbl. in the third quarter last year; Gulf Refining Co., 66,454,874 bbl. against 49,964,822 bbl.; Texas Pipe Line Co., 52,488,396 bbl. against 55,738,934 bbl.; Interstate Oil Pipe Line Co., 48,004,722 bbl. against 46,718,185 bbl.; and Service Pipe Line Co., 46,279,253 bbl. against 48,727,446 bbl.

Top companies in transportation revenue were Service Pipe Line Co., $14,223,181 against $16,094,940 last year; Sinclair Pipe Line Co., $9,866,111

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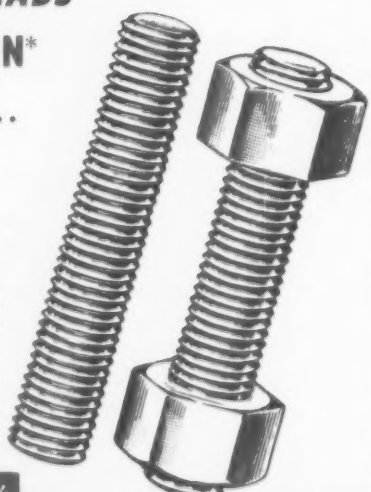

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against $9,739,812; Humble Pipe Line Co., $9,599,860 against $10,427,963; Great Lakes Pipe Line Co., $9,282,984 against $9,322,202; and Magnolia Pipe Line Co., $8,502,277 against $8,439,486.

Platte to Increase Capacity Of 940-Mile Crude System

KANSAS CITY.—Construction is under way on two additional main-line pump stations which will increase the present capacity of Platte Pipe Line Co.'s 940-mile, 20-in. crude system from 110,000 bbl. to 145,000 bbl. daily.

The stations, which are being constructed by Great Plains Construction Co., Fairbury, Neb., will be located in Holdrege, Neb., and Gower, Mo. They will be similar to the existing four modern pump stations along the line, which extends from Wyoming producing areas to the Wood River, Ill., refining region.

Platte is owned by British American, Continental, Ohio, Pure, and Sinclair oil companies.

Hearing Opens on Changes In Huge Gas Line Project

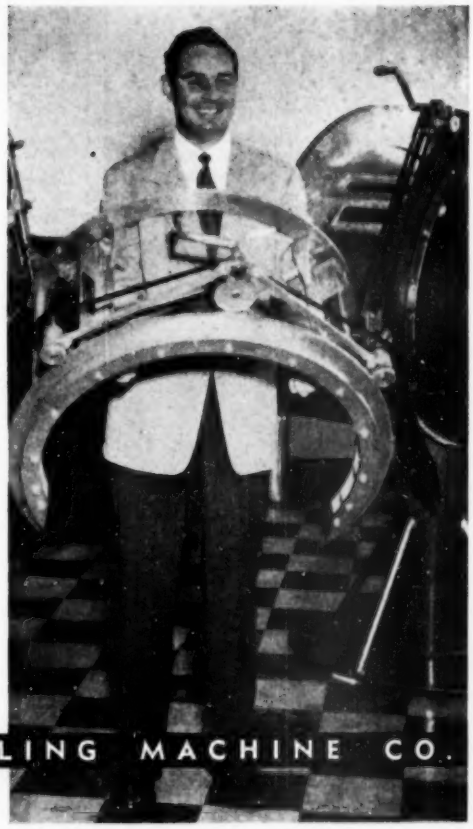
WASHINGTON.—A Federal Power Commission hearing opened here last week on proposed changes in a huge pipe-line construction program to supply West and Midwest states with natural gas from the Southwest.

The changes are being sought by El Paso Natural Gas Co. and Permian Basin Pipe Line Co. El Paso wants to drop a previously authorized 112-mile, 30-in. gas line from the Spraberry Trend area to Plains, Tex., and make changes in approved compressor-station horsepower and interconnecting lines. The new plan calls for Permian to transport the Spraberry gas to Plains for El Paso. This change has received temporary authorization by the FPC along with other operational changes by the two companies and Northern Natural Gas Co. *(The Oil and Gas Journal, December 14, page 181).*

In order to deliver this gas, which will amount to 225,000,000 cu. ft. daily, Permian asserts it will need permission to add two 1,320-hp. compressor units at its Spraberry station.

If the changes are authorized, El Paso seeks permission to abandon about 11 miles of line which would no longer be needed. The firm pointed out that these changes will result in El Paso and Permian not building duplicate lines in the Spraberry and savings of approximately $5,884,000.

H & M PIPE CUTTING AND BEVELING MACHINES NOW 40% LIGHTER!



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Here are the amazing new weights of the H & M Pipe Cutting and Beveling Machine: #3 machine — 14" to 20" pipe formerly 89½ lbs now 53 lbs.; #4 machine — 22" to 26" pipe formerly 123 lbs. now 66 lbs.; #5 machine — 28" to 36" pipe formerly 155 lbs. now 95 lbs. (all weights are approximate).

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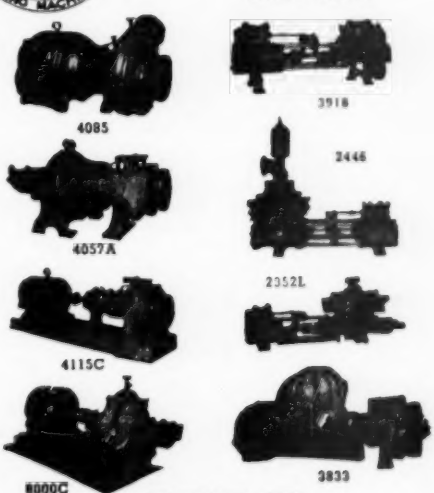

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REFINING

Corpus Christi Buys Closed Palestine, Tex., Refinery

PALESTINE, Tex.—The old Inland refinery here has been purchased by Corpus Christi Refining Co. from Byrd Oil Corp., and will be placed into operation this week.

The refinery, which was closed last April, will turn out about 4,500 bbl. of jet fuel, high-octane gasoline, and residuals. Facilities include a 2,500-bbl. topping unit, 1,700-bbl. thermal cracking unit, and 400-bbl. poly unit.

The property belonged to Inland Refining Co. until the company merged with Anco Gas Corp. last year. Byrd acquired the 9-acre tract in a merger transaction with Anco last spring.

Platforming Units Now Number 71, A.C.S. Told

NEW ORLEANS.—A total of 71 Platforming units are now operating or contracted for in this country or abroad with an aggregate charging capacity of 390,000 bbl. of naphtha per day, according to figures presented at the American Chemical Society's regional conclave here December 12 by Dr. Gustav Egloff of Universal Oil Products Co.

Of the total of 71 units, 12 are designed for full or part-time operation in the production of aromatic chemicals. Their total daily productive capacity would approximate 3,180 bbl. of benzene, 7,320 bbl. of toluene, 2,660 bbl. of mixed xylenes, and 265 bbl. of ethyl benzene.

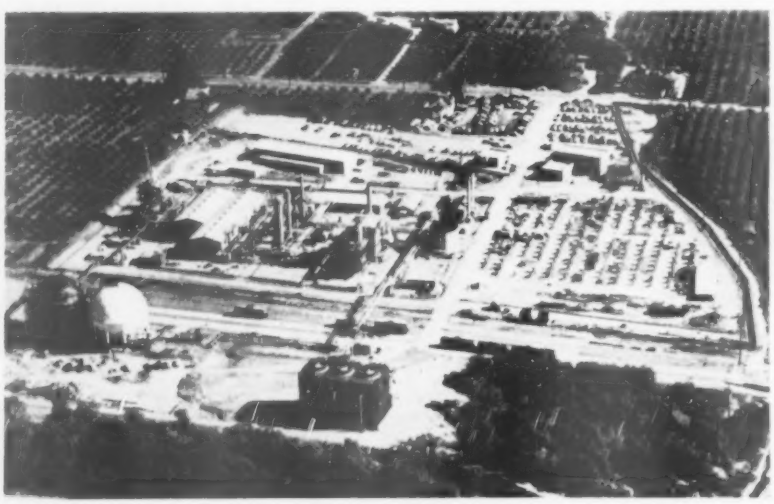
Egloff estimated that about 1,000,000 bbl. of straightrun refinery naphthas and natural gasoline is available in this country as chargeable feed stock for catalytic reforming.

Refining Briefs

CLEVELAND, Okla.—Johnson Oil Refining Co. has shut down its 6,300-bbl. refinery here for necessary repairs. The refinery is expected to go back on stream within 2 weeks.

SUGAR CREEK, Mo. — Standard Oil Co. (Ind.) has completed new engineering and research facilities at its 73,000-bbl. per day refinery here. The new three-story building houses refinery administration offices, engineering offices for 40, oil inspection, analytical and gas laboratories, conference room, and library.

LOS ANGELES.—Union Oil Co. is completing preliminary engineering studies for modernization and expansion of its Los Angeles refinery shiploading facilities. Plans call for construction of about 600 ft. of new



Shell Chemical Opens New Ammonia Plant

Shell Chemical Corp. officially opened this $10,000,000 synthetic anhydrous ammonia plant near Ventura, Calif., December 11. The new facilities will produce 150 tons of ammonia per day augmenting the company's 300-ton per day capacity at Pittsburgh, Calif., to maintain the firm's lead in nitrogen manufacture on the Pacific Coast.

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Uniform heat distribution, the most desirable characteristic of any fluid heater, is created in an Isoflow furnace as the result of the following design characteristics:

1. Individual burners, symmetrically spaced with relation to the tubes, create a symmetrical flame pattern with relation to the heating elements

2. The metal cone at the top of the combustion chamber re-radiates to the tubes, also diverts products of combustion progressively closer to the tubes, and combines the proper proportion of radiant and convection heat to give the uniform heat intensity at the upper portion of the combustion chamber.

3. The combustion gases are diverted behind the tubes so that the gases recirculate from the top of the heater downward, behind and between the tubes, thus increasing the heat input to the rear of the heating elements by convection.

4. The recirculated gases also serve to reduce the combustion temperature, reducing the heat intensity at the bottom of the furnace.

The above design factors in Isoflow heaters, combined with the angle of the cone, provide the uniform heat distribution required in heaters for the most efficient process operation.

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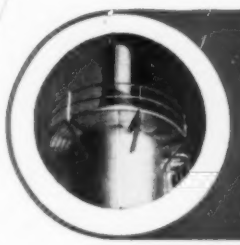
More than 1150 are in operation throughout the world in the petroleum, chemical and allied industries . . . for all processes and for any duty, pressure, temperature and efficiency . . . and all Petrochem-Isoflow Furnaces are pre-eminently satisfactory.



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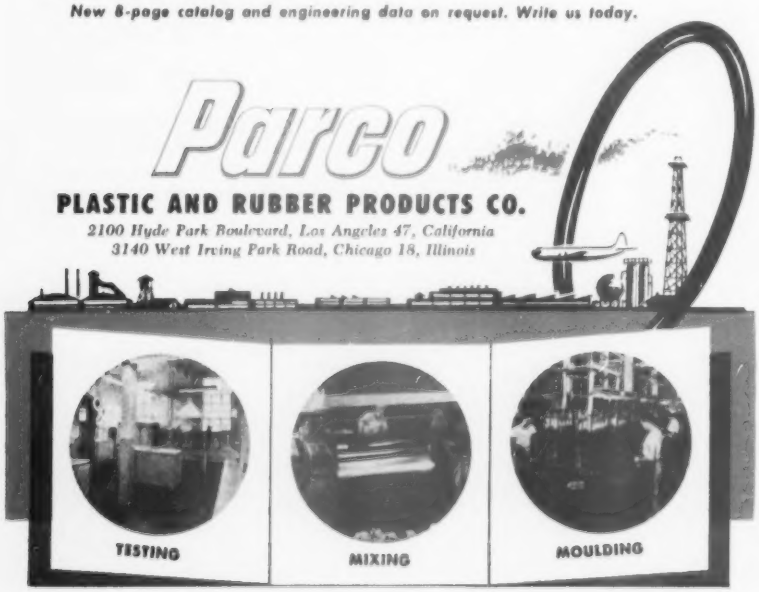

wharf, which will enable the safe simultaneous berthing of two tankers without interfering with barge operations.

Petrochemicals

Warren Shifts Location of New Plant to Conroe, Tex.

TULSA.—Warren Petroleum Corp. has decided to build its first petrochemical plant at Conroe, Tex., 40 miles north of Houston, instead of on the Houston ship channel as was originally planned.

The Conroe site, Warren officials decided, offers a more favorable source for raw materials from a facility in which Warren has a substantial interest —Midland Gasoline Co.'s natural-gasoline plant, rated at 1,808 bbl. of L.P.G. daily.

The new plant will be located on the site of Humble Oil & Refining Co.'s former production camp about 3½ miles east of Conroe and adjacent to the Santa Fe Railway. Construction will begin about January 15 next year, and completion is scheduled for June 1954.

Warren will employ the hydrocarbon oxidation process to produce pentaerythritol, methyl alcohol, acetaldehyde, and other petrochemicals from either propane or butane or their mixtures.

Annual production will be about 2,500,000 lb. of pentaerythritol, 4,000,000 lb. of methyl alcohol, and 2,000,000 lb. of acetaldehyde.

Bakelite's New Polyethylene Plant in Full Production

NEW YORK.—Full-scale operation has been reached in the new Texas City, Tex., polyethylene plant of Bakelite Co., a division of Union Carbide & Carbon Corp.

With a capacity for producing 60,000,000 lb. per year, the new plant boosts domestic production of this versatile plastic by 45 per cent.

The current critical shortage of polyethylene will further be alleviated when Bakelite places two more 60,000,000-lb. plants on stream. The second will come into production next summer at Seadrift, Tex., and the third will be on stream at Torrance, Calif., in early 1955. By that time, a total of seven companies are expected to be in polyethylene production compared with the present two.

As capacity increases, the price is expected to decline. In 1943 the plastic brought $1.00 per lb. and earlier this year slid from 70 cents to 60-65-cent range.

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Jim Ogden and M. C. Chancellor of Chancellor & Ogden, Inc., vacuum tank service company of Long Beach, are two pioneers in California, Texas and Oklahoma oil industry operations. Read what they say:

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"Continued customer satisfaction is proof."

If you have a liquid or semi-solid moving problem you'll want to know the whole story. Thompson UVT are made in 20-100 bbl. capacity; truck, trailer, semi or skid-mounted; priced about what you'd expect to pay for a good car. New complete Unitized Vacuum Tank Trailer will be ready soon. Watch for the announcement.

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For use wherever large volumes of heated air are required. Available as a complete unit, ready for installation or burner unit only for installation in customer's heater.

A new and efficient solution to an old, annoying problem. Dumped gases can now be burned without smoke. The smokeless Field Flare Burner is another example of the aggressiveness of JOHN ZINK and his engineers.

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NATURAL GAS

Gas Allocated

Transco to deliver extra supplies to 15 customers

WASHINGTON.—The Federal Power Commission has allocated 64,000,000 cu. ft. of gas per day from the system of Transcontinental Gas Pipe Line Corp., Houston, for delivery to 15 of the company's customers.

A total of 47,047,000 cu. ft. daily was allocated on a permanent firm basis, and 16,953,000 cu. ft. per day was allocated on a temporary firm basis. The final disposition of this latter gas will be determined at hearings opening February 8 in Washington, D. C.

In addition, the commission's order covered the allocation of 18,900,000 cu. ft. of gas daily, part of which is included in the permanent allocation, on a temporary firm basis until April 1, 1954, because the customers for whom it was originally intended will not be able to take until then.

Diverted from New England . . . The 64,000,000 cu. ft. of gas became available when Transcontinental was unable to deliver the gas for resale in New England. The company planned to allocate the gas to 11 of its existing customers but several other companies and municipalities intervened in the proceedings.

Permanent and temporary allocations went to nine firms in New Jersey, New York, Pennsylvania, and Delaware. Six firms and municipalities received permanent allocations in Virginia, Georgia, and North and South Carolina. The commission pointed out that if the 16,953,000 cu. ft. of gas is placed on a permanent firm basis, it will go to several other localities in the latter three states.

Decision on Gas for Pacific Northwest Delayed Further

WASHINGTON.—A decision in the nearly 2-year-old fight for the Pacific Northwest gas market is still several months away, according to a Federal Power Commission spokesman here.

In order to speed up the decision, Pacific Northwest Pipe Line Co., one of the three firms seeking authority to transport gas to the area, has requested that the examiner's report be omitted from the proceedings. However, the FPC has not acted upon this request and may not until testimony from numerous witnesses is heard.

A request that a decision be reached by March 1, has been made by C. R. Williams, president of Pacific Northwest. Williams asserted that any delay beyond this date may result in the new market area not getting gas for the 1954-55 heating season.

Pacific Northwest plans to transmit gas from the San Juan basin in New Mexico.

The others petitioning for the disputed market, Northwest Natural Gas Co. and Westcoast Transmission Co., Ltd., propose to get their gas supply from Alberta fields.

NATURAL GASOLINE

Texas Commission Approves 200,000-Bbl. Storage Project

AUSTIN.—Texas Natural Gasoline Corp., Tulsa, has received Texas Railroad Commission authority to carry out a proposed 200,000-bbl. underground L.P.G. project in Southeast Texas.

The storage will be in the Barbers Hill salt dome of the Henry Griffith Survey, Chambers County. The company will be allowed to create an indefinite number of cavities gradually expanding the capacity of the project to 300,000 bbl.

In addition, Texas Natural's affiliate, Texas Gas Products Corp., is seeking permission from the commission to carry out two 100,000-bbl. L.P.G. underground-storage projects in Texas. One storage proposal covers a 20-acre lease in the old Weiner Floyd area of Glasscock County, and the other a 20-acre tract in the old Pembrook field, Upton County *(The Oil and Gas Journal, November 9, page 190).*

Mid-Co Texas Plant Closes

AUSTIN.—Mid-Co Gasoline Co.'s gasoline plant north of Cayuga in Henderson County, Texas, has been shut down due to insufficient gas volume.

The plant had an intake capacity of 10,000 cu. ft. of gas per day, and an output of about 120 bbl. daily of natural gasoline and L.P.G. The owners, Middleston Brothers of Corsicana, Tex., are investigating the area for a new plant site.

C.N.G.A. Accepts New Tables

LOS ANGELES.—The recently published recalculated and extended A.S.-T.M.-I.P. Petroleum Measurement Tables have been officially adopted by the executive committee of the California Natural Gasoline Association here.

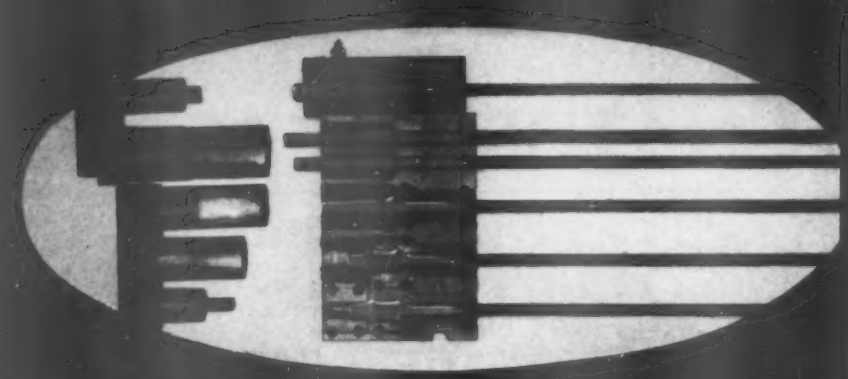
In addition, revisions in Tables 1 and 2 of the association's Bulletin TS-441 were necessitated in order to conform with the tables. Copies of these revisions will be available this week at the C.N.G.A. office, 510 West Sixth Street, Los Angeles.

El Paso Using Back-Hoes to Clean Out Shot Rock

El Paso Natural Gas Co.'s efforts to transmit an additional 300,000,000 cu. ft. of gas from Texas to California run into difficulty in Arizona. The ground contains so much rock that explosives are used to prepare a trench for the company's new 30-in. transmission line from Plains, Tex., to Kingman, Ariz. Back-hoe machines follow the blasting crews to clear out shot rock. (Caterpillar Tractor Co. photo.)

1. forging

The length of stock gathered for the upset, in comparison with the diameter of the rod, makes the upsetting of sucker rod ends an extremely difficult operation. Rods are first preheated to 2250° F. Then, as this side view of the forge die blocks and punch holder shows, the various passes in the upsetting operation are made.



2a. control

Furnace chart on Salem rod normalizing furnace. This chart instantly records any temperature variation and permits complete control of heat throughout the furnace.

2. heat treating

After years of careful study Axelson has developed heating and cooling time cycles to produce the best mechanical properties. The carefully controlled production furnace insures uniform grain structure from end to end and the best combination of strength, ductility and shock resistance.

3. descaling

Group of forged rods after normalizing, tempering and shot blasting. Note uniformity, cleanliness, lack of surface defects. Removal of scale will reveal any rolling or forging defects. Rods are *rechecked* at this point for straightness.

4. threading

Axelson single spindle operation permits better control and supervision over each individual rod. In the final threading operation a self opening die head (center foreground), especially designed for this work, is run on the pin, cutting the threads to the proper distance. An accurate lead screw controls the feeding of the die head onto the pin.

WHY AXELSON SUCKER RODS LEAD THE FIELD

For over 61 years Axelson has been producing equipment for the Petroleum Industry. Specialized knowledge of the field and in techniques of manufacture make Axelson products natural leaders.

Sucker rods are a case in point. Experience proves that there are a number of closely related steps necessary in making a good rod — the steel, design of the rod, metallurgical and manufacturing controls, rigid inspection at each succeeding step, the care with which rods are packed and shipped.

Here are 4 of the specialized manufacturing steps which lead to Axelson sucker rod quality, a number of which are exclusive with Axelson.

Send for Bulletin #5306

FIRST **. . . to use vanishing threads; to improve the curve of the upset ends into the body of the rod; to use nickel-molybdenum steel; to normalize and temper the rods throughout their entire length.**

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EXPLORATION

Wyoming Devonian Oil Indicated

by John C. McCaslin

DEVONIAN oil has been indicated on a drill-stem test at a deep well in Garland field, Big Horn County, hinting the possibility of the first commercial recovery from this formation in Wyoming (A on map).

Ohio Oil Co. recovered a maximum of 1,400 ft. of heavy black oil on drill-stem tests at 4,303-4,407 ft. at 6 Unit, SE Lot 58B, 28-56n-97w. The first test taken at the well was of the interval 4,191-4,302 ft. It recovered 60 ft. of oil-cut mud and 270 ft. of mud-cut heavy black oil. This test was of a zone that has produced in Garland field for many years, but because of trouble in identifying it, it has been included in the Madison (Mississippian). Top of the Devonian was previously called by sample at 4,186 ft. The present Devonian classification is tentative pending further study of that formation. Ohio is coring below 4,759 ft. The well is to go to the granite expected at about 6,100 ft. A drill-stem test in the Big Horn (Ordovician) at 4,512-4,618 ft. recovered 250 ft. of water-cut mud in 1 hour.

There have been no previous shows of significance in Devonian rocks in Wyoming. Devonian is absent in most oil-producing areas of the state. The Ohio test is located in the Big Horn basin where sediments range in age from Cambrian through Recent. The maximum sedimentary section is estimated to be about 17,000 ft. The Big Horn basin has production from the Cretaceous, Triassic, Jurassic, Permian, Pennsylvanian, Mississippian, and recently from the Ordovician. The central part of the basin has had very few tests of pre-Cretaceous rocks. There have been very few tests made of pre-Mississippian rocks anywhere in the Big Horn basin. A recent Ordovician strike and the current Devonian indication promise to open up new avenues for exploration of the Lower Paleozoic rocks in the basin.

The Devonian in Wyoming is divided into the Threeforks and Jefferson formations. The Threeforks occurs in the deeper wells of Oregon Basin field, and has been reached before in Garland field. It is recognized as a group of green, gray, or red shales, thin limestones, and one or more thin sandstones, lying just below the Madison of Mississippian age.

The Jefferson is recognized only at Shoshone Canyon with certainty. According to T. F. Stipp, Jefferson fossils were found in the upper part of the top of the Big Horn dolomite (Ordovician), and it is possible that this upper member may constitute the Jefferson of the Big Horn basin.

Deposition of the Devonian in Wyoming is limited to the northwestern part of the state. In the Wind River basin there is an estimated 15,000 to 20,000 ft. of sedimentary rock section, with all ages from pre-Cambrian to Recent, except the Silurian, represented. Devonian rocks are restricted to the western portion of this basin. Strata in the Powder River basin range in age from Middle Cambrian to Eocene, with Lower Cambrian, Silurian, and Devonian rocks absent. The Middle Cambrian occurs only in the western part of the basin, while Ordovician rocks are restricted to the northern portion. Green River basin sediments range in age from Cambrian through the Eocene. Because of the great thickness of sediments throughout much of this basin (in excess of 30,000 ft.), very little is known of the pre-Mesozoic rocks except from wells on the Rock Springs uplift and outcrops along the basin margins.

First Ordovician oil production was opened last fall in Wyoming at 51 Government in Hamilton dome field, Hot Springs County, (B on map), by Argo Oil Corp. The new pay discovery swabbed 500 bbl. of 13° to 15°-gravity oil per day from the Big Horn dolomite found at 3,542 ft. Previous production in the field was from the Embar (Permian), Tensleep (Pennsylvanian), and Madison (Mississippian).

The Big Horn dolomite at the type section of the eastern slope of the Big Horn mountains is 250-300 ft. thick, consisting of massive limestone or dolomite. The Big Horn dolomite has been drilled into by only a few wells, and has not been found oil-bearing previously, except for a few shows.

Garland field was the first oil discovery in the Big Horn basin, which is Wyoming's biggest oil-producing basin. The field was opened in 1906 with Frontier (Cretaceous) production. The Garland structure is an anticline along a line of folding that trends northwest and southeast in the northern part of the basin.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS . . . C. E. Marsh 1 Lea, 1-mile east extension to Lea-Ellenburger pool in Crane County, found the Ellenburger 75 ft. high structurally and completed for a daily potential of 1,704 bbl. In Gaines County Alsabrook 1 Riley opened deep production between Russell and West Seminole fields. Its Wolfcamp potential was 1,042 bbl. of oil daily and 681 bbl. daily from the Devonian.

NORTH DAKOTA . . . Amerada Petroleum Corp. recovered 492 bbl. of 38.8°-gravity oil per day at 2 Kvam, C SW NE 19-156n-95w, deep test in Beaver Lodge. The well flowed from perforations at 10,390-10,445 ft. in the Jefferson (Devonian) and through 22/64-in. and 15/64-in. chokes.

OKLAHOMA . . . Mercury Drilling Co. et al. have a Deese sand discovery in Grady County at 1 Whitener, C NW NE 25-5n-7w. After fracture treatment the well flowed 10 bbl. of oil per hour on 18/64-in. choke from perforations at 9,369-77 ft. Testing continues.

Wyoming Completing a Record Year

Two dozen oil discoveries added so far in 1953

by John C. McCaslin

THE biggest oil-producing state in the Rocky Mountain region is enjoying a record year in both development and exploratory activity.

Operators have completed 24 new oil discoveries in Wyoming this year and 3 new gas pools have been added to the impressive list. Completions in the state show a 21 per cent gain over last year. The most active area in the state is the Powder River basin, particularly the eastern flank in Weston County where 52 rotary rigs are currently active. The search for Mesaverde production in the Green River basin highlights southwestern Wyoming drilling activity this year, while the first commercial production from formations of Ordovician age in Wyoming has been opened in Hot Springs County to bring increased interest to the Big Horn basin. The completion of the Platte Pipe Line has encouraged an active buildup of development work in the state's big fields and has sparked increased exploratory work in all areas. Crude-oil production in Wyoming has soared to new records this year, and is currently running at about 220,000 bbl. per day.

Powder River basin . . . (Fig. 1). This basin is Wyoming's most active oil-producing area. Weston County on the eastern flank of the basin is the most active area in the entire Rocky Mountain region this year. The county now produces more than 5 per cent of the state's total daily production. Ten new locations have been staked in the area. Three wildcats are at critical depths, and one new discovery has been added to the significant success record of the county.

The rapid expansion of Newcastle production southwestward from the Clareton area (B on map in Fig. 1) in Weston County is one of the most significant developments in the Rocky Mountain region in 1953. Revival of this area of the basin began last winter with the opening of Southwest Clareton pool by Big Horn-Powder River Corp. and J. D. Sprecher's 1 Wakeman, which flowed 975 bbl. of oil per day from the Newcastle sand through a ⅜-in. choke.

The new trend was pushed further southwest by Voss Oil Co. last spring with the opening of Newcastle production in the Black Thunder Creek area, 2½ miles southwest of Southwest Clareton pool. The pool opener was completed for 250 bbl. of oil per day on the pump. Offsets and extensions to this new pool have met with excellent success.

R. L. Manning 1 Sedgwick, a ½-mile south stepout to Black Thunder Creek pool, had an initial flow gage of 1,425 bbl. of oil per day on ¾-in. choke. Northern Drilling Co. 1 Government, in the Southwest Black Thunder Creek area, reported a flow gage of 20 bbl. of oil per hour through open tubing for the latest Newcastle discovery in southwestern Weston County. This is the westernmost discovery in the broad southwestward extension of the Clareton trend. Nearest production is about 3 miles to the northeast.

This fall, Irving Pasternak completed a good Newcastle well at 1-B Johnson in the Wild Horse Butte area (A in Fig. 1) of the county about 5 miles north and east of Clareton production. Farther to the south of the Clareton and Black Thunder Creek areas, W. F. Hammond reported a flow gage of 1,500 bbl. of oil per day through a ½-in. choke at 1 Gaskill, in the Cheyenne River area of southern Weston County (C in Fig. 1). The discovery is the most southerly yet made in the current program to extend production south and southwest of Clareton field. It is about 4 miles southwest of the discovery in the Black Thunder Creek area made earlier this year. The operator reports that at least five wells will be drilled in the near future in this immediate area.

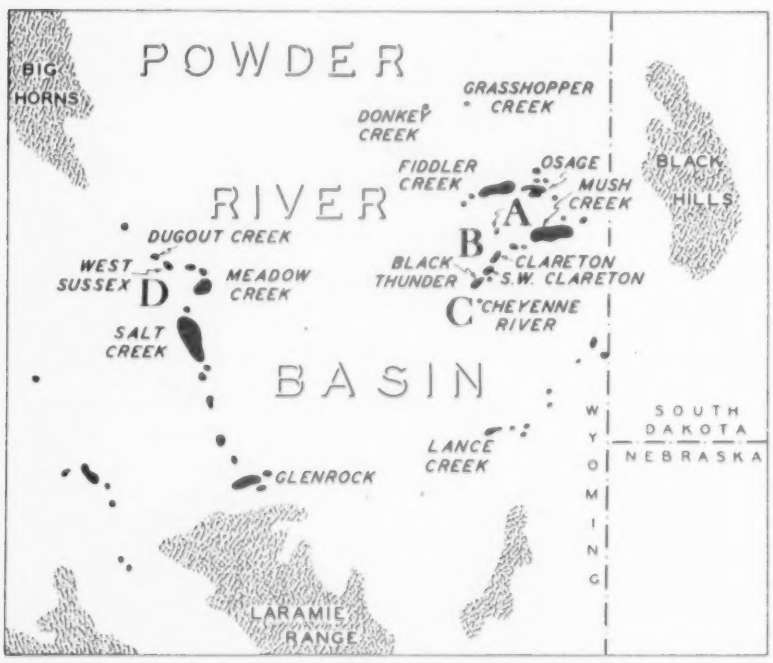

Fig. 1—The Powder River basin is Wyoming's most active oil-producing area. Weston County activity is the highest in the entire Rocky Mountain area.

Western Powder River Area

Activity on the western side of the Powder River basin has been highest in the Sussex-Meadow Creek area (D in Fig. 1). Continental Oil Co.'s development program of this area recently added Jurassic-Sundance pay to the producing formations of the field. There has been no previous Sundance production on the west side of the basin east

MIDLAND

SSC's PERMIAN BASIN DISTRICT OFFICE

Many of the exploration problems encountered in the Permian Basin of West Texas and New Mexico have been solved by refraction and reflection techniques pioneered and developed by SSC.

Though there are still many seismic problems peculiar to this area remaining to be evaluated, SSC's Field Research Laboratory personnel are making substantial contributions toward their ultimate solution.

The findings of this Field Research unit, combined with SSC's 350 crew-months of seismic experience in the Permian Basin, provide its District Office personnel a sound backlog of knowledge for selecting effective exploration procedures.

For information concerning seismic or gravity contract rates and crew availabilities in the Permian Basin area, contact Seismograph Service Corporation,

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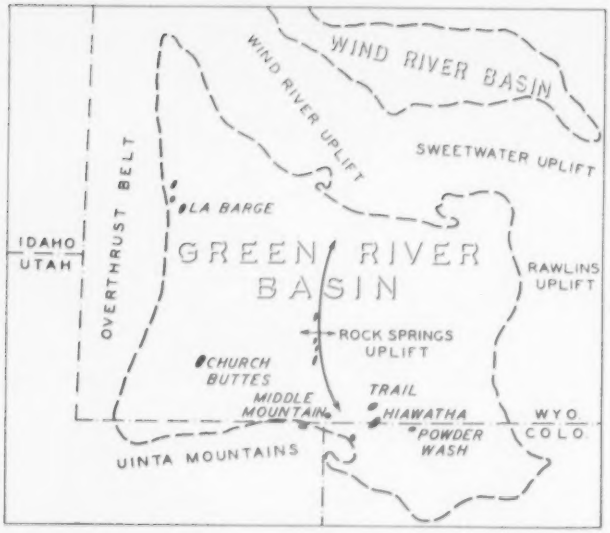

Fig. 2—Green River basin activity this year is highlighted by the search for Mesaverde production. The basin is Wyoming's most promising basin for big gas reserves.

Fig. 3—The Big Horn basin, the Rockies' biggest producer, has two new pays this year, the Ordovician and possibly the Devonian.

of Salt Creek, although several fields in the Wind River basin farther west produce from this formation. There is also Sundance production in Lance Creek field in Niobrara County on the southeast flank of the Powder River basin.

The Pennsylvanian-Amsden pay recently brought to seven the number of pays in Sussex-Meadow Creek field, four of which are Cretaceous sands. Shallow Cretaceous sands in West Sussex field have extended that area to the west, with Shannon pay found at only 2,900 ft.

The prolific stratigraphic traps on the gently dipping eastern flank of the Powder River basin were set up by the shore lines of the Cretaceous-Newcastle sea. The western side of the basin is steeply dipping, highly faulted, and rich in oil-bearing sands and structures. The various trapping conditions and the many pays in this basin are expected to keep it high in activity for many years.

Green River basin . . . (Fig. 2). The search for Mesaverde production in the Green River basin highlights southwestern Wyoming drilling activity in 1953. This is Wyoming's most promising basin for big gas reserves.

Stanolind Oil & Gas Co. successfully confirmed its Middle Mountain unit Mesaverde discovery in Sweetwater County, recovering 5,500 M.c.f. of gas, and has a third well under way. The new gas strike is a confirmation to the discovery in this formation completed last year as the first production from this formation in this area of Wyoming. The Middle Mountain discovery well was completed for 169 bbl. of oil and more than 1,000 M.c.f. of gas per day from 6,534-55 ft. It is the world's highest producing well with a ground elevation of 9,050 ft. To the northeast at Trail, Mountain Fuel Supply Co. completed a Mesaverde gas well for 4,260 M.c.f. daily at 7,350 ft.

These two discoveries attracted considerable attention to the Mesaverde as a potential producing zone in this section of Wyoming. The formation is not a major producer north of the San Juan basin, although recent discoveries have been made in the Mesaverde in Utah and production has been known from the formation in other areas of Wyoming for some time. Several wildcat tests are slated for the western flank of the Green River basin in the Big Piney and LaBarge areas.

The latest Mesaverde discovery in the basin flowed 4,670 M.c.f. of gas daily at Mountain Fuel Supply Co. 1 Government in the Sugar Loaf area of Moffat County, Colorado.

Big Horn basin . . . (Fig. 3). Activity in the biggest producing basin in the Rocky Mountain region has been heavy this year. Big Horn basin fields produce more than 50 per cent of the oil in Wyoming and 30 per cent of the oil produced in the entire Rocky Mountain region.

One of the most significant finds of the year was at Argo Oil Co. 51 Government in Hamilton Dome field in Hot Springs County. (A in Fig. 3). The discovery swabbed 500 bbl. of oil per day, 13°-15° gravity, from perforations in the Big Horn dolomite of Ordovician age for the first commercial production from formations of Ordovician age in Wyoming. Previous production in Hamilton Dome field is from Embar, Tensleep, and Madison. The field has produced more than 21 million barrels of oil since its discovery in 1918.

Another significant strike this year is Gulf Oil Corp.'s South Manderson area (B in Fig. 3) Phosphoria discovery, the 1 Thomas. The big strike was completed for a gage of 807 bbl. of oil per day. The well is one of the largest recent producers in Wyoming and is significant as a considerable southwestward extension of production in the Manderson area. Drilling in the area has not been sufficient to determine whether the Gulf well is on a separate feature as it is now rated, or whether it is an extension of the producing structure within the unit area proper. There are two wells drilling in the Manderson unit area currently. The Manderson discovery was made more than a year ago, but development was delayed pending unitization. Considerable activity is also under way in the Cottonwood Creek unit in Washakie County along the east side of the Big Horn basin. Stanolind Oil & Gas Co. recently completed a Phosphoria discovery at Cottonwood Creek for an initial production of 188 bbl. of oil per day on the pump.

The latest significant strike in the basin is Ohio Oil Co.'s Garland field Devonian possibility in Big Horn County. The 6 Unit, SE Lot 58B, 28-56n-97w, recovered 1,400 ft. of oil on drill-stem test of the Devonian. There has been no previous show of significance in Devonian rocks in Wyoming. Deposition is limited generally to the northwestern quadrant of the state, with Devonian absent in most oil producing areas.

KANSAS

Oil-Cut Mud Recovered At Norton Wildcat

Barnett Oil Co. has set casing at an indicated new Lansing discovery in Norton County, northwestern Kansas.

The 1 Legg, SE SE SE 32-2s-24w, 6 miles northwest of Norton pool, recovered 120 ft. of gas and 200 ft. oil-cut mud with 1,095 psi. bottom hole pressure on drill-stem test at 3,405-44 ft.

Southwest of this wildcat about 6 miles R. W. Shields has casing set to test Lansing oil shows at 1 Mizell, SW SW NW 10-3s-25w, 8 miles northwest of Norton pool. On drill-stem test at 3,522-70 ft. in the Lansing-Kansas City recovery was 15 ft. of free oil and 60 ft. of oil-cut mud.

Arrow points to William Grunerwald's apparent Viola oil discovery, 1 Ed Williams, NW NE NW 26-15s-9e, rank wildcat 11 miles southeast of Alta Vista gas pool in eastern Morris County. The indicated pool opener is east of the Nemaha granite ridge on the west edge of the Forest City basin which extends through northeastern Kansas, northwestern Missouri, southwestern Iowa, and southeastern Nebraska. Recovery on a drill-stem test at 3,090-96 ft. was 1,360 ft. of oil and 40 ft. of muddy oil. Bottom hole pressure measured 1,040 psi.

Testing Under Way at Possible Barber Hit

Mississippian gas shows are being tested at a possible Barber County discovery, San Diego Oil Corp. The wildcat is located 2¼ miles south of Rhodes pool in the southeastern part of the county. A drill-stem test at 4,457-4,502 ft. gaged 3,400 M.c.f. of gas and recovered 30 ft. gas-cut mud and no water.

MICHIGAN

Commercial oil production appeared to be all but assured from the Richfield at Don Rayburn 1 Meyer, N½ NE SE 25-20n-3w, Franklin Township deeper horizon wildcat, Clare County.

Hole carried 200 ft. of free oil natural on early tests after both upper and lower pay sections in the Richfield had been perforated. Well was scheduled to be acidized and tested. Hole was cored to 5,269 ft., total depth. Two stringers in the bottom part of the cored Richfield, one 2-ft. stringer and one 3-ft. stringer were perforated. After this operation, hole was reported to have carried free oil and

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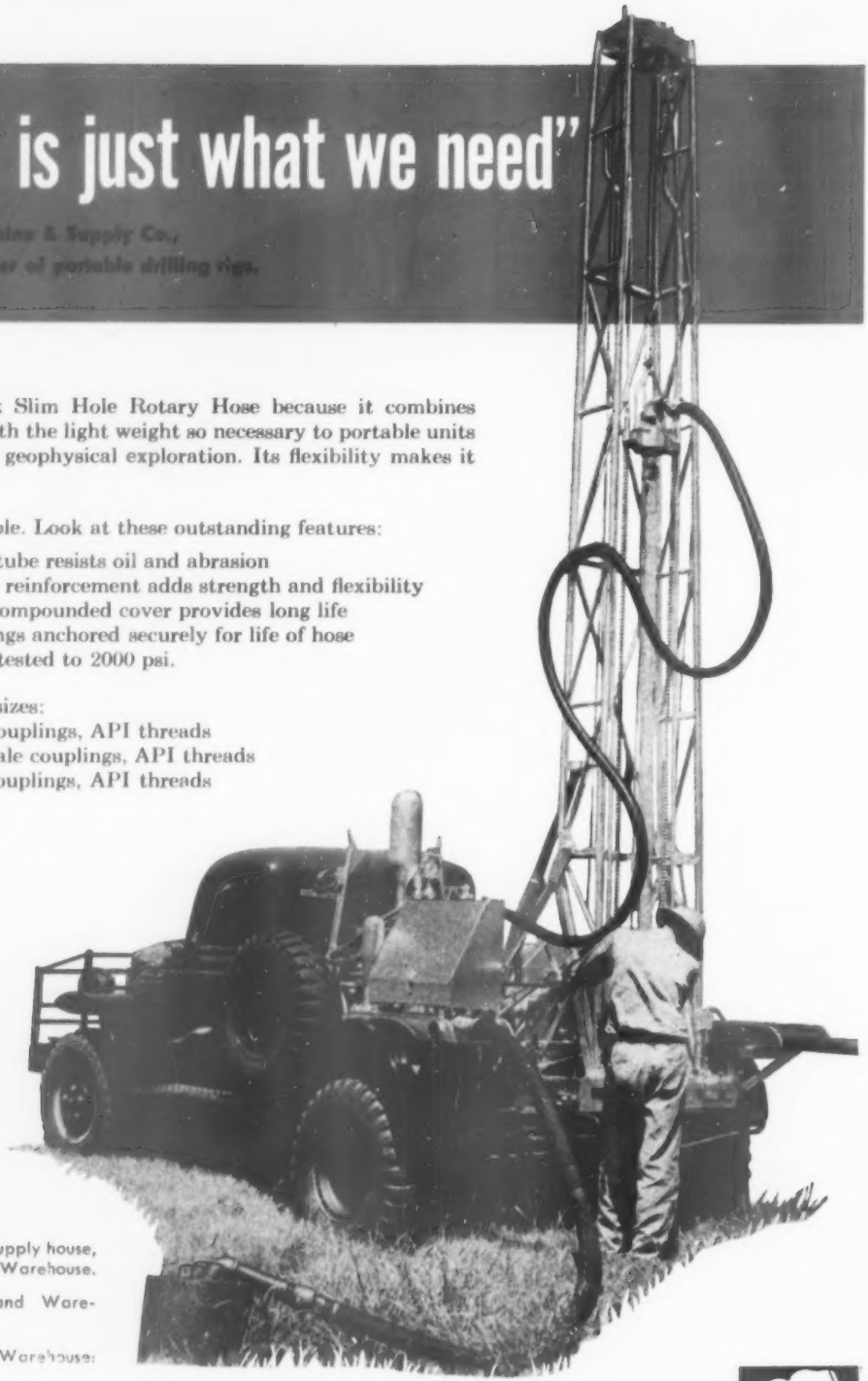

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gas. The next pays perforated were at points between 5,033 and 5,100 ft. Although detailed information was not available following perforations, well was reported to have shown an increase in oil and gas fill-up after these upper, thicker and better Richfield pays had been opened. Other horizons, the Traverse, Dundee and Detroit River "sour zone," which showed oil and gas pays when tested en route to the Richfield, will probably not be opened for testing and completion at this time.

First show of gas from the Detroit River "sour zone" was logged at about 3,348 ft. at the Alan S. Gray 1 Webb, NE NE SE 20-15n-11e, Grant Township, Huron County. A long-string of 5-in. casing was set prior to further deepening in this pay objective. The 1 Webb, an older and abandoned Dundee wildcat, was deepened by Gray from 2,909 ft., old total depth, after Alvin H. Weber & Muskegon Development Co. logged oil in the "sour zone" at the 1 Blondell, NW NE NW 29-15n-11e, nearly 1 mile southwest. The 1 Blondell, which is still being tested, appears to be a certain small oil discovery well for 1953.

CANADA

Five Hits Indicated In Western Provinces

Five exploratory drillers in three of the western Canadian provinces were chalked up as indicated gas or oil discoveries during the past week. Among those strikes were three gas discoveries in Alberta, one gas find in Saskatchewan and a probable oil discovery or extension in Manitoba.

The Alberta gas discoveries were made in central and central east Alberta, at Hughenden, Rolly View and Falun. The Hughenden discovery well, Naco 4-29 Hughenden, LSD 4, 29-40-7w4, is 70 miles northeast of Stettler and 25 miles south of Wainwright, about 40 miles west of the Saskatchewan border. That well indicated about 20 ft. of gas-productive sand in the Lower Cretaceous, from 2,730-50 ft., and flowed at rates reaching nearly 4,000,000 cu. ft. daily during drill-stem tests. Hole, scheduled as a deeper test, is now drilling below 3,000 ft. Owner of this well is Naco, Ltd., of Calgary, who has an approximate 78,000-acre crown exploration reservation in the area.

At Rolly View, Union Oil Co. of California struck a thin gas sand in the basal quartz section of the Cretaceous at its Union-Imperial 4-5 Kneller wildcat that is on a farmout tract from Imperial Oil, Ltd. This well, on LSD 4, 5-50-23w4, is about mid-way between the Leduc and Joseph Lake oil field, being 17 miles south of Edmonton. Drill-stem test from 4,128 to 4,151 ft. flowed gas at rate of 6,800,000 cu. ft. daily and also sprayed salt water. A maximum of 7 ft. of water-free gas sand has been indicated at this site, and well is now being deepened below 4,500 ft.

The other central Alberta gasser this week is the California Standard Co.'s 14-11 South Falun wildcat, LSD 14, 11-45-27w4, nearly 9 miles southeast of the Westerose oil discovery well, 18 miles west of Wetaskiwin and 45 miles south-southwest of Edmonton.

This venture gave up its gas from the Blairmore, during drill-stem test from 5,093 to 5,123 ft. Gas flow rate was 4,050,000 cu. ft. daily and recovery was 5 ft. of mud and 1 ft. of naphtha (light crude oil). Like the other discoveries, this venture is being deepened for lower objectives.

The Saskatchewan gas discovery this week is owned by the Phillips Petroleum Co. of Oklahoma and Husky Oil & Refining, Ltd., team, and lies near the town of Marengo, 18 miles southwest of the first major light-gravity oil field in that province—Smiley. The well, Phillips-Husky 1 Marengo, LSD 10, 26-28-27w3, is 23 miles west and southwest of Kindersley. Drill-stem tests in the Viking sand, between 2,492 and 2,518 ft., flowed gas at rates exceeding 1,500,000 cu. ft. per day. The well is continuing to core and test.

The indicated new oil pool discovery, or possible extension to a previous 1953 oil discovery in southwest Manitoba, was drilled by the major exploration and development company in that province—The California Standard Co.

Cal-Standard gave up recoveries of 34°-gravity crude oil from the Mississippian limestone at its 3-11 Scallion wildcat, which is 2½ miles northeast of the Roselea oil field and 3½ miles north of Virden.

The third indicated oil discovery in Manitoba this year, the Scallion well is located in LSD 3, 11-11-26w1, 2½ miles from the B. A.-Union 13-27 oil well at Roselea. The Mississippian was entered at 1,898 ft., and drill-stem tests in that limestone formation gave recoveries ranging up to 930 ft. of clean water-free crude oil.

This is the second discovery that Cal-Standard has made in Manitoba so far this year. The other was at Whitewater Lake, 44 miles south-southwest of Brandon, 28 miles northeast of the Waskada oil strike and 15 miles north of the North Dakota border.

The California Standard Co. discovered Manitoba's first commercial oil production in January of 1951, and since that time has continued an extensive exploration and development program in the province. Numerous other exploration companies have entered into the Manitoba 'play,' and the province is expected to produce about 580,000 bbl. of crude oil during the 12 months of this year.

A new 34-million cu. ft. per day gas well in Fort St. John field in British Columbia was announced today by Van-Tor Oils & Explorations, Ltd. The well is the 30 Fort St. John, drilled by Pacific Petroleums, Ltd., on the famous Permit No. 22 acreage in the Peace River area in which Van-Tor has a 10 per cent interest.

The 30 well is the 16th gas well completed in the Fort St. John area, 11 of which are on the 48,600 acres comprising Permit No. 22. Well 30 is located in Section 20, Township 83, Range 18, almost in the center of the huge tract, and it is the biggest gas well in the area to date.

The 30 well was bottomed at a depth of 4,836 ft., and flowed initially at a rate of 8.7 million cu. ft. of gas daily. After the well was shot and swabbed the rate of flow increased to 34 million cu. ft. daily. It has been capped, as distribution facilities from the field have not been constructed.

Gas reserves of Fort St. John field, principally located on Permit 22 acreage of Pacific Petroleums and Van-Tor, have been officially estimated at 1,422 billion cu. ft. The new well No. 30 is expected to raise the estimated total reserves.

Gas from this Peace River area is earmarked for consumers in Pacific Northwest cities of the United States and Canada and construction of a pipe line from the field to the Pacific Coast is scheduled to begin when, as and if, a decision of the Federal Power Commission permits Canadian gas to be imported into the United States.

EASTERN CANADA

Ontario . . . In Lambton County, Imperial Oil Co. is finishing another well on the Gordon Hollingsworth farm in Warwick Township near Watford, with indicated production of 15 bbl. a day. Test is in the Guelph-Niagara formation below 2,300 ft.

and is being treated with 2,500 gal. of acid under 1,400 psi. Discovery well in the same general area, finished several months ago, is reported maintaining a flow of 120 to 150 bbl. a day.

In the Alvinston area, Brooke Township, several shallow tests for oil have finished dry, and additional wells are being drilled on the Ray Watson and Robert Gardiner farms.

In Aldborough Township, Elgin County, Britco Oils has started its first test well in a new exploratory program on 2,206 acres representing a group of 29 properties. Acreage is south of Mosald gas field near Wardsville, and west of the recent oil discoveries in the Rodney district.

James Bay . . . The Ontario provincial government is clearing the way for development of the James Bay area in the northern part of the province. As a preliminary step the area is being cleared of untested leases under which hundreds of thousands of acres have been tied up on a speculative basis without any serious intent to carry on development. Under an amendment to the Mining Act earlier this year, leases were reduced to a minimum of 64,000 acres and were made subject to early exploration, with a minimum of $1 an acre to be spent on actual survey work and drilling. Lessees under the new scheme will post bonds with the Mines Department, to be forfeited if development is not undertaken; and leases are being made on a checkerboard basis, with the government reserving alternate blocks.

A report recently issued by the Ontario Mines Department assembles all the information so far obtained regarding the geology of the James Bay basin. While there is no definite proof of commercial oil or gas in the vast area under survey, indications are that the sedimentary formations in the deltaic area south and west of James Bay are in some respects similar to those of southwestern Ontario where oil and gas have both been found in commercial quantities.

Gaspe . . . In the Gaspe peninsula, Quebec Province, The 2 Bald Mountain is below 6,160 ft. in the hardest lime formation yet encountered. On the Galt Brook Dome Continental Oil Co. 1 deep test is below 3,238 ft. after shooting when the hole deviated from vertical. The 1 asphalt base is below 2,008 ft. with oil coming from the upper formations.

The 1 Tar Point, making gas at 7,069 ft. is preparing to resume from that depth.

OKLAHOMA

More Pay Flows Oil At Washita Strike

A good drill-stem test is reported at Gulf Oil Corp. 1 Goeringer, important discovery in the C NE SE 28-11n-16w, Washita County. A drill-stem test was taken at 12,260-443 ft., with tool open 28½ hours. The well flowed water cushion in 55 minutes, gas in 60 minutes and oil in 75 minutes. For the first 7 hours and 40 minutes the flow was turned to pits. Flow of oil was then gaged at 208 bbl. of fluid in 21 hours, 97 per cent oil, 2 per cent water and 1 per cent basic sediment. Oil flow averaged about 10 bbl. per hour with gas volume gaged at 1,300 M.c.f. per day.

A previous drill-stem test taken at 12,226-337 ft., open 22 hours, flowed 198 bbl. of fluid in 9 hours, nearly all oil. Later it flowed 119 bbl. of fluid in 7 hours, most of it being oil.

Misener Discovery to Complete In Garfield

George J. Greer, trustee, and San Juan Drilling Co., will complete their Misener sand oil discovery 12 miles southeast of Enid in Garfield County.

The 1 Ruth L. Hammer, NE NW NE 2-20n-5w, tested the Misener sand at 6,645-51 ft. Oil flowed at the estimated rate of 50 bbl. per hour. A second Wilcox test showed for salt water with no shows reported in the Marshall, also.

First Wilcox Reached At Garfield Discovery

George J. Greer, trustee, and San Juan Drilling Co. have reached the first Wilcox sand and are drilling ahead in the Marshall zone at 1 Hammer, Misener sand discovery well in the NE NW NE 2-20n-5w, Garfield County.

Misener sand was topped at 6,640 ft. and 50 bbl. of oil per hour estimated flowed on drill-stem test at 6,645-51 ft.

KENTUCKY

EASTERN KENTUCKY

In Big Sandy gas field and on the waters of Bull Creek in Floyd County, Grover Lowe has completed 1 Jack Derossett as a Maxon (Mississippian) gas well at a total depth of 1,093 ft. With a rock pressure of 90 psi. well gaged initially 343,000 cu. ft. of gas daily.

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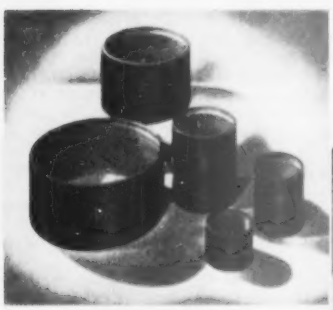

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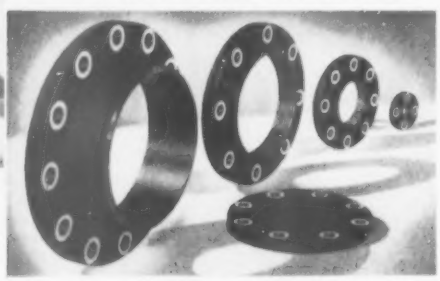

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In Magoffin County and located on Mash Fork, Oliver Jenkins has completed J. J. Prater for 5 bbl. of oil daily from Weir (Mississippian) sand at a total depth of 1,065 ft.

WESTERN KENTUCKY

Magnolia Petroleum Co. 2 Mrs. H. H. Gabhart, 20-P-21, 1½ miles southeast of Smith Mills in Henderson County, has been finaled for 1,650 bbl. of oil per day flowing from highly saturated McClosky lime at 2,603-09 ft.

CALIFORNIA

Devils Den Yields Large Oil Discovery

Carlton Beal & Associates 56-11 Kalloch, ½ mile east of shallow Devils Den field in northwestern Kern County, was completed flowing 31°-gravity crude at the rate of 570 bbl. daily. Production was from sand stringers in the Tumey shale, Oligocene age, at intervals between 4,590-4,865 ft. Flow was through a 20/64-in. choke, with a tubing pressure of 450 psi.

The discovery, located in NW SE 11-25s-18e, was drilled on an 840-acre farmout from Gilliland Oil Co. and C. O. Davis. Other acreage holders near the discovery include Hancock Oil Co. and Standard Oil Co. of Calif. Production is from the southeast flank of the Pyramid Hills thrust fault, which was encountered at 4,100 ft. The name of Moose Hill has been requested.

Old River Find Completed

A new field discovery in the Old River area southwest of Bakersfield resulted from Superior Oil Co. 51-36 K.C.I., in NW NE 36-30s-26e. Initial production was 86 bbl. of 35°-gravity crude in 21 hours through an 8/64-in. choke. Bottomed at 8,500 ft., with 7-in. casing set at 8,200 ft., the discovery was producing from the Stevens sand through perforations at 8,096-8,104 ft. Nearest production is East Gosford field, which also produces from the Stevens, about 1½ miles northwest.

Mission Field Extended

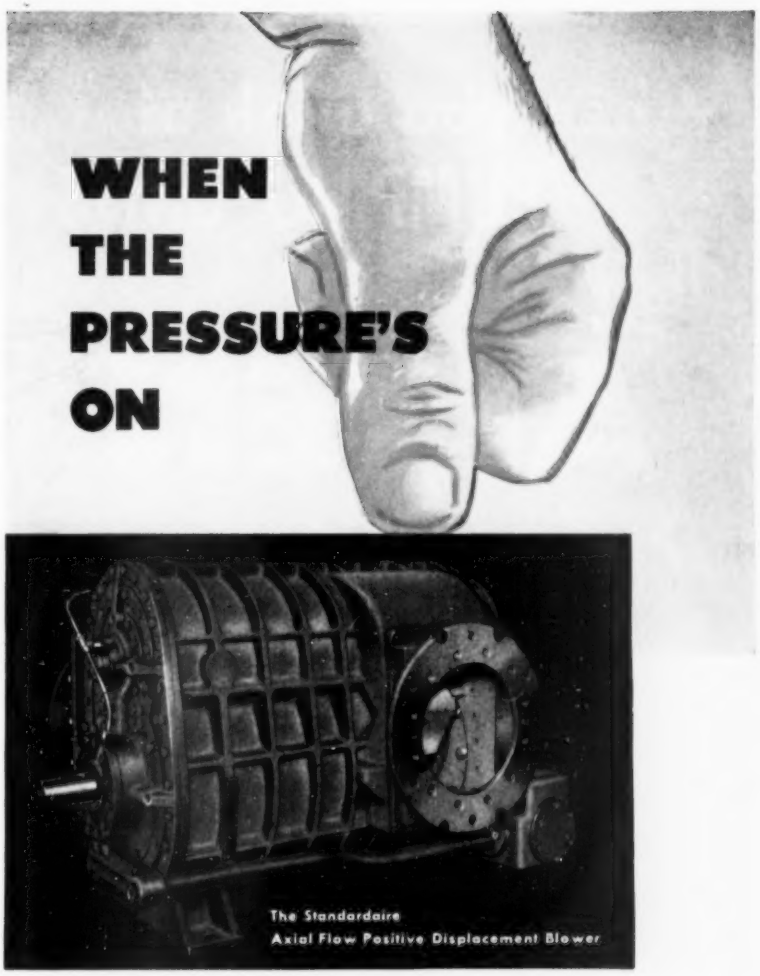
Standard Oil Co. of California was in process of completing 1 Mission-5 as a ¼-mile east extension to its Mission field discovery of last May. The latter was completed in the Luisian sand (Miocene) through perforations at 7,175-7,338 ft., flowing 229 bbl. of 28°-gravity crude daily. The extensioner, located in NE NE 2-2n-16w, Los Angeles County, was being completed through perforations at 5,990-6,195 ft.

D-7 Zone for San Miguelito

Another of Ventura Avenue's deeper producing zones has been extended into the San Miguelito field, which borders on the former to the northwest. Continental Oil Co. 701 Grubb was completed in the D-7 zone at 10,379-12,081 ft., flowing about 1,100 bbl. of 31°-gravity crude through a 15/64-in. choke. Last April the shallower D-5 and D-6 zones were proven productive in San Miguelito.

Shallow Mount Poso Find

Intex Oil Co. was preparing to complete 2 Gill as a possible Vedder sand discovery 2



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miles northwest of the Mount Poso field in Kern County. The wildcat, located in NW NE 24-26s-27e, topped the oil zone at 2,133 ft., and was preparing to run casing after being bottomed at 2,166 ft. Intex has staked location for 1 Connell-U.S.L., also a Vedder sand test, about 1¾ mile north.

Second Harnish Offset Dry

L. A. Harnish, Oper. 86 32F, a southeast offset to the operator's recent discovery at West Guijarral Hills, Fresno County, was abandoned at 8,831 ft. Thus both southeast and southwest attempts to extend production in the 8,000-ft. Leda sand pool were failures. Prior to the successful completion of the 1,000-bbl. discovery in SE NE 32-20s-16e, Harnish also failed to find production at a wildcat ½ mile north. To the northwest, in NW NE Section 32, Russell Giffen 62 32F was drilling at approximately 8,550 ft.

ILLINOIS

Big Well Completed in Illinois in November

The biggest oil well drilled in Illinois since August of 1949 was completed in November. This well, located in Sailor Springs Consolidated pool in Clay County, had an initial production of 2,320 bbl. of oil per day from the Rosiclare sandstone. Estimated production for Illinois for November was 5,024,000 bbl., with a daily average for the state of 168,000 bbl., as compared with a daily average of 166,000 bbl. in October.

There were no new pools discovered in Illinois in November, but extensions were completed to four pools: Bungay Consolidated in Hamilton County, Flora in Clay County, Inman East Consolidated in Gallatin County, and Parkersburg Consolidated in Edwards County. One new pay was reported, a sandstone in the Borden group, in the Weaver pool, a Devonian pool in Clark County.

A total of 237 wells were completed in November, a 4-week period, or an average of 69 per week, as compared with 55 per week during October. All of the seven wildcats drilled over 2 miles from production were unsuccessful; 4 of the 33 wildcats completed less than 2 miles from production resulted in extensions to pools. One of the four extensions had previously been completed as a dry hole.

One hundred and fifty-two oil wells were completed in pools, including 10 wells which had previously been completed as dry holes. Initial productions of many of the wells completed during November were unusually high, with one-third of them producing at least 100 bbl. per day and seven producing over 300 bbl. per day.

Noah Petroleum Co. 1 Berry, 30-1s-12w, Wabash County, was good for 205 bbl. of oil per day natural from the O'Hara lime at 2,413-19 ft. It is 1½ miles from good production and is on the west side of Mt. Carmel, Illinois.

Two breaks in the McClosky made 18 bbl. of oil per hour at Coy Oil, Inc. 1 Heitman et al, 1-5n-6e, Clay County, 3 miles northwest of Bible Grove. The operator is preparing to test the Aux Vases at 2,702-20 ft. This is a ¾-mile extension to Bible Grove pool.

A good Rosiclare well is noted in Lawrence County at John Zanetis 1 Webster, 8-2n-12w, 6 miles southwest of Lawrenceville. The well is a 3 location step out, and is flowing 33 bbl. of oil per hour after mud acid treatment.

LOUISIANA

NORTH LOUISIANA

Smackover Discovery at Colquitt Is Completed

Republic Natural Gas Co. and Crescent Drilling Co., Inc., A. M. Jackson, and A. C. Duerr have completed a Smackover discovery at Colquitt in Claiborne Parish.

The discovery well of the new pool is the 1 Martin & Cain et al Unit, 27-23n-6w, ½ mile northeast of Colquitt. It flowed 928 bbl. of 51.7°-gravity oil and 1,565 M.c.f. of gas per day through ¼-in. choke from perforations at 10,108-120 ft. in second porosity of Smackover lime. Pinched back to a 10/64-in. choke the well flowed 291 bbl. of oil per day with gas-oil ratio up to 2,248 psi., tubing pressure 2,900 psi.

The new strike is 4⅛ miles southeast of production in the Gordon area of East Haynesville field, and 5 miles east of production in southern part of the same pool.

Test Being Run at Rodney Island Confirmation

Heep Oil Corp. and Associates are making production tests at the confirmation well to the discovery well of new Rodney Island field in eastern Tensas Parish, east Louisiana.

The 1 Joseph M. Harper, 13-10n-12e, kicked off and flowed an estimated 150 bbl. of oil and 10 to 15 per cent acid water per day through ¼-in. choke from perforations at 9,169-9,200 ft. The top of the producing formations in the confirmation well is 82 ft. higher than top of the producing zone in the discovery well.

The discovery well of Rodney Island was the 1 Magnolia-Learned, 10n-12e. The well flowed 166 bbl. of oil per day through ½-in. choke from perforations at 9,252-60 ft. in the Massive sand of the lower Tuscaloosa. The pool is located about 4½ miles southeast of Locust Ridge and 5 miles west of Rodney field in Jefferson County, Mississippi.

SOUTH LOUISIANA

Second Well Produces In New Cut-Off Area

California Co. is completing its 2 Alton Jones "2," in 46-17s-21e, as a new oil and gas discovery producer in the recently opened Cut-off area, 8 miles southwest of West Delta Farms field, in Lafourche Parish. Location is northwest of a deep oil and gas discovery well, 1 Cloverly, completed by California Co. and Superior Oil Corp. last September.

The new well, in tests of a Miocene sand zone, perforated at 11,566-74 ft., flowed at the rate of 312 bbl. of 38°-gravity oil and 3,135,660 cu. ft. of gas per day through 10/64-in. choke with pressure of 3,775 psi.

In an earlier test of a deeper zone, perforated at 11,902-08 ft., it flowed 24 bbl. of distillate with 1,600,000 cu. ft. of gas per day through 10/64-in. choke with 3,650-psi. pressure.

Second South Iowa Well Produces Gas-Distillate

The second well for the recently opened deep producing area on the south flank of Iowa Dome, in Calcasieu Parish, has been completed by Shell Oil Co. at its 1 Lowe estate, diagonal northeast offset to the discovery well, Richardson & Bass 1 Wait.

The new well, in pay more than 200 ft. shallower than in the discovery well, flowed 300 bbl. of 50°-gravity distillate with 2,499,000 cu. ft. of gas daily through 10/64-in. choke. Pay, in lower Frio sand, is open through casing perforations at 10,730-50 ft.

Richardson & Bass' discovery well was an oil-producer, flowing 417 bbl. of 38.1°-gravity crude per day through 8/64-in. choke at completion Its pay, also in lower Frio sand, is at 10,962-72 ft.

In the meantime, the area has received a set-back with the apparent failure at Shell's 1 Broussard, east offset to the discovery well and south offset to the new Lowe estate producer. The Broussard well tested salt water in sand at 10,756-66 ft., and rig has been moved off.

Three additional tests are drilling in the immediate area, which is approximately a mile from other production in Iowa field.

Deep Bastian Bay Well Uncovers New Pay Zone

A new, deep producing zone, 2,100 ft. below the field's regular pay, has been opened by Phillips Petroleum Co. at Bastian Bay, in the coastal marshes of southern Plaquemines Parish. The discovery well, 6 Fasterling, in 44-20s-28e, flowed at the rate of 375 bbl. of 35°-gravity oil per day on a test through 12/64-in. choke with 1,650-psi. pressure. The new pay, open through casing perforations at 11,162-78 ft., still is in Miocene sand.

The well encountered the field's regular

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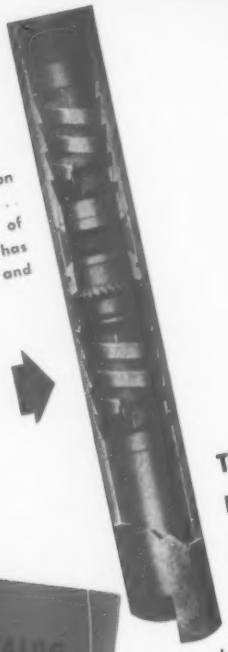

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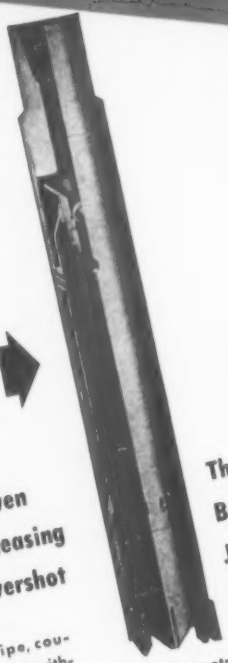

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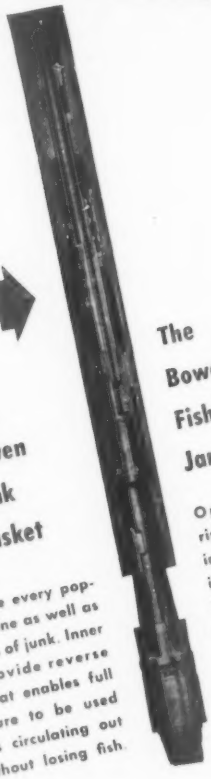

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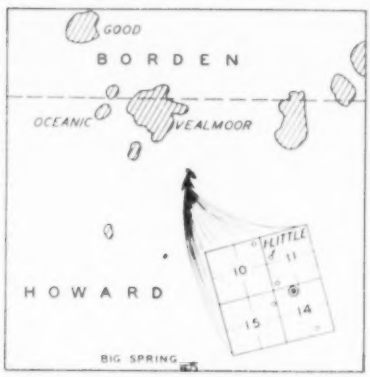
pay zone at 9,100 ft., where commercial production also was indicated. The hole, 15 months in drilling, was carried to 14,262 ft. Phillips holds leases on 4,700 net acres in the field.

TEXAS

WEST TEXAS

Rapid Development Indicated For Howard County Pool

A confirmation well for the new Luther-Siluro-Devonian field of northern Howard County was in sight at week's end, and four new locations had been made.



Expanded view of the new Luther pool in Sections 10, 11, 14 and 15, Block 32, T2N, T&P Survey, showing the discovery and new locations. Texas Pacific Coal & Oil Co. 1 Little in SW NW Section 11 is the second prospect for the pool. The firm's discovery, A-1 Tom Spencer, was completed in September from pay at 9,855-80 ft. Its potential was 428 bbl. of oil a day through 20/64-in. choke.

Texas Pacific Coal & Oil Co. and others prepared to test and complete 1 Little as a long northwest offset to the field discovery. This well had top of the Siluro-Devonian at 9,850 ft., minus datum point of 7,143 ft. which was correlated exactly flat with the discovery in Section 14. First test of the formation in 1 Little from 9,875-9,900 ft. developed 642 ft. of oil in 3 hours, and on test from 9,895-9,950 ft. the well headed oil. Recovery included 180 ft. of fresh water. Operators ran casing and perforated between 9,892-9,922 ft. but the well was still making water at this report.

Meanwhile Texas Pacific had scheduled four new operations in the pool, indicated by circles on the accompanying map.

Location of Oceanic pool in relation to other Pennsylvanian reef areas is also shown on the map. Phillips and Oceanic are principal developers of the pool, which had seven completed wells at last report. Pay is found around 8,140 ft. and potentials have ranged up to 2,350 bbl. daily. Currently, two wells are drilling here, and two are in location stage.

Crane County . . . Lion Oil Co. and C. E. Marsh 1 Lea, 1-mile east extension to Lea-Ellenburger pool, has been completed in pay from 8,240-80 ft. On completion potential the well flowed at the rate of 1,704 bbl. of 42° oil a day.

In the same area, Atlantic Refining Co. 1-C Barnsley, ½-mile northeast of the field discovery, added a new pay zone to the field and was slated for dual completion.

Flow tests on perforations at 8,138-56 ft. in Connell sand (middle Simpson) gaged 10 bbl. of oil an hour through ¼-in. choke, through tubing. With that section packed off, the well flowed 232 bbl. of oil in 4 hours from open hole in the Ellenburger at 8,218-84 ft., gaged through ½-in. choke.

NORTH TEXAS

Grayson Wildcat Reports Oil Shows on Drill-Stem Tests

A. R. McElreath estate and J. W. Carter 1 Varley, 2½ miles northeast of Collinsville in John W. Rich Survey, A-1034, has had oil shows at three separate levels.

Recovery from interval at 5,134-41 ft. was 30 ft. of free oil and 35 ft. of heavily oil-cut mud. Drilling continued after the test. Previous shows were found from 3,091-98, 3,579-86 and 4,508-14 ft.

Northwest of Dorchester, Superior Oil Co. 1 Max Shelton prepared to run electrical surveys to total depth at 7,322 ft. Last test from 7,294-7,307 ft. developed salt water with no shows.

Standard Oil Co. of Texas 7 Rising, deep test 1½ miles north of Sherman, in the Sherman field area, perforated casing from 9,585-9,606 ft., then flowed oil at the rate of 210 bbl. daily plus 2,310 M.f.g. through 12/64-in. choke. Following that it flowed 240 bbl. of oil in 12 hours.

Star Oil Co. 1 Heironimus, wildcat 5 miles north of Sherman, was held up by a fishing job at 7,884 ft. Drill-stem test from 7,334-50 ft. failed mechanically.

In Throckmorton County, Taubert & Harper 1 Copeland, Pennsylvanian sand prospect 1½ miles north of Elbert, recovered 360 ft. of gas and 10 ft. of oil and gas-cut mud at 3,329-33 ft., then developed 655 ft. of clean oil on test from 3,329-36 ft. Operators were running casing for completion attempt.

SOUTHWEST TEXAS

Nueces County Wildcat Completed as Producer

Southern Minerals Corp. and Magnolia Petroleum Co., joint operators, have completed a new oil-discovery well approximately 4,500 ft. southeast of South Clara Driscoll field, in Nueces County.

Their 1 Johnson, the discovery well, producing from a casing-perforated interval at 5,398-5,408 ft., in Frio sand, flowed 31.75 bbl. of 41.9°-gravity oil per day through 9/64-in. choke with pressure of 680 psi. Gas-oil ratio was 652 cu. ft. per barrel.

The new discovery, separated from South Clara Driscoll field, is designated as Southeast Driscoll.

Fourth Pay Zone Opened in New Corpus Christi Field

Austral Oil Exploration, Inc., has opened another pay zone, the fourth, for the new field, discovered last April, in Corpus Christi bay, 8 miles southeast of Corpus Christi.

The discovery is in the company's 2 State Tract 20, dually completed with oil production from the field's 8,600-ft. sand, and gas-distillate production from the new sand, perforated at 8,052-67 ft.

From the new sand, the well flowed at the rate of 3,394,000 cu. ft. of gas daily

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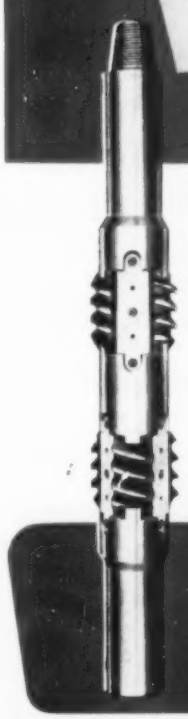

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through 14/64-in. choke with distillate yield of 45 bbl. of distillate per million cubic feet of gas. Production from the oil sand, perforated at 8,626-32 ft., was 47.56 bbl. per day through ¼-in. choke.

The new well is 265 ft. northwest of the operator's original discovery well, 1 State Tract, completed as a gas-distillate producer from sand at 8,003-11 ft. Six wells have been completed within a radius of 1½ miles.

TEXAS GULF COAST

Gas Production Opened In Alligator Point Area

First production for the Alligator Point area, in southeastern Brazoria County, has been established with the completion of a sizable gas well by Brazos Oil & Gas Co. at its 2 Houston Farms Development Co.

On open-flow potential test, the new discovery well produced at the rate of 48,500,000 cu. ft. of gas per day. Pressure, shutin, gaged 2,615 psi. Production is from a casing-perforated interval at 6,520-24 ft.

Location, in the Pierce Miller Survey, is 14 miles southeast of Liverpool, and 6 miles south of Halls Bayou field. It is approximately 2,000 ft. east of the company's initial test, a dry hole.

APPALACHIAN AREA

OHIO

Two producers were added to Shearer pool in Bethlehem Township, Coshocton County. National Gas Co. 4 C. G. Conrad, second quarter, made a good oil showing natural and 150 bbl. in 24 hours after fracturing from Clinton, found at 3,316-3,374 ft. James Shearer et al 3 Charles Fox, second quarter, made 160 bbl. in 24 hours after fracturing a good oil showing in sand at 3,351-3,400 ft.

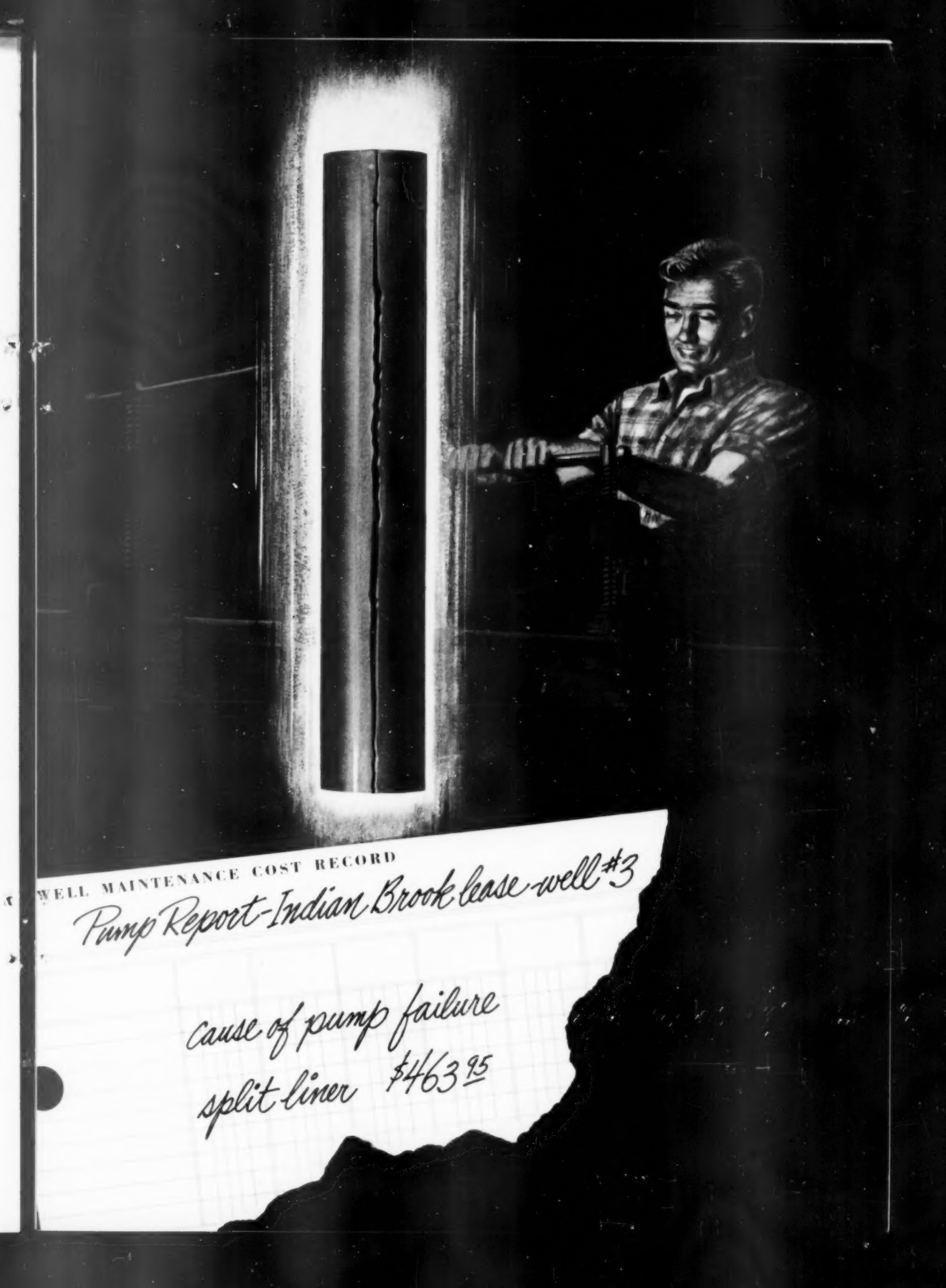
Oxford Oil Co. moved in ¼-mile west of an abandoned well on Hiram Rector, Lot 28, Perry Township, Licking County, and found an oil showing in Clinton at 2,962-3,007 ft., that increased to 35 bbl. in 24 hours after fracturing. This is in an undrilled area that may develop into a pool.

In the north part of New Castle pool, Preston Oil Co. 8 Heffelfinger, Section 18, New Castle Township, Coshocton County, made 220 bbl. in 24 hours after fracturing Clinton found at 3,354-3,417 ft.

WEST VIRGINIA

In Middle Fork district, Randolph County, West Virginia, a deep rank wildcat test to the Oriskany sand has been announced by P. C. McKenzie Co. 1 Elk Horn Coal Corp., elevation 2,289 ft., Pickens Quadrangle, 2.32 miles south of latitude 38 degree 55 minutes and 2.72 miles west of longitude 80 degrees 5 minutes. The depth to be reached is approximately 8,000 ft. Bobray Exploration Co., has staked No. 1 Chester C. Housh, elevation 2,048 ft., Sago Quadrangle, 4.9 miles south of latitude 38 degrees 55 minutes and 3.15 miles west of longitude 80 degrees 00 minutes. In Roaring Creek district, Nelson W. Taylor, Agt., for Edwin J. Fitzgerald et al, has 1 Paul King, elevation 2,461 ft., Sago Quadrangle, .68 mile south of latitude 38 degrees 55 minutes and 1.6 miles west of longitude 80 degrees 00 minutes. In Licking district, Tucker County, Snee & Eberly are drilling at 200 ft., in W. H. Blair, Belington Quadrangle, 2.25 miles south of latitude 39 degrees 15 minutes and 1.5 miles west of longitude 79 degrees 45 minutes.

Cherry Hill Township, Indiana County, southwest Pennsylvania, Chestnut Ridge Oil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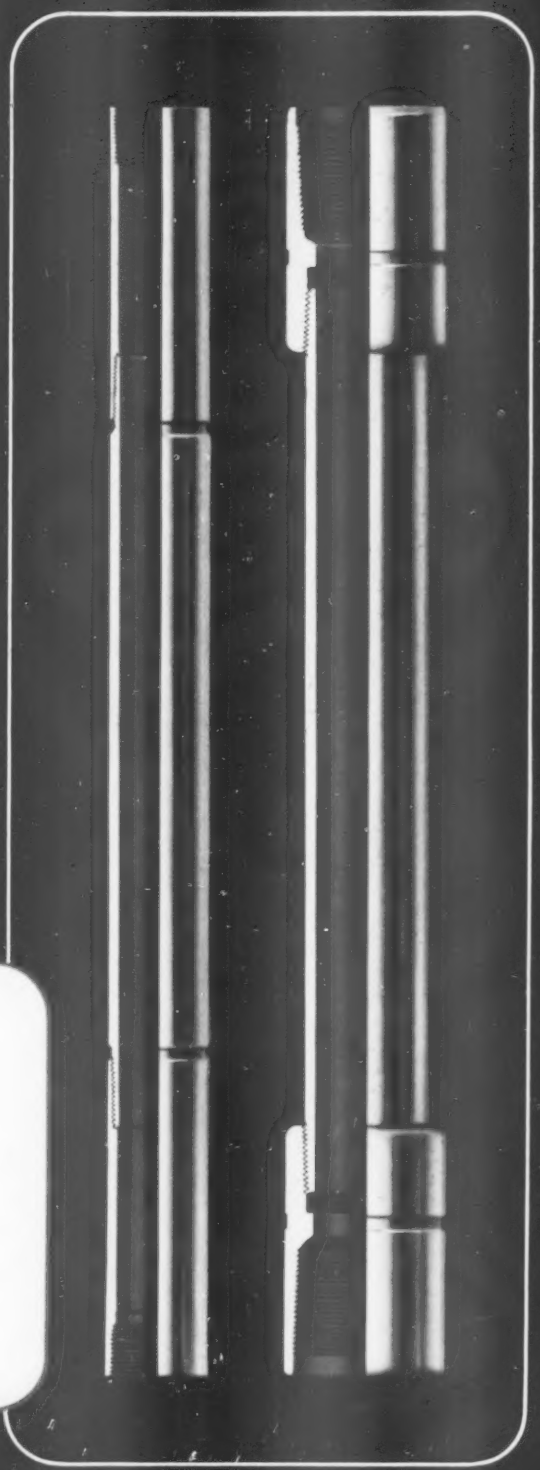

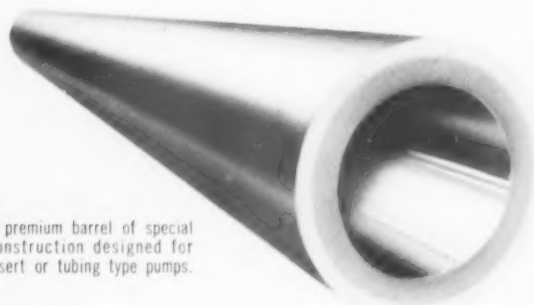

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& Gas Co., has located 1 Ralph White, deep wildcat, elevation 1,740 ft., Indiana Quadrangle, 4.36 miles south of latitude 40 degrees 40 minutes and 2.94 miles west of longitude 79 degrees 00 minutes. Buffalo Township, Washington County, Washington Oil Co. 1 Kelly-Southerland is shut down at 6,829 ft., after a gas blow-out forced the drilling line up the hole.

ROCKY MOUNTAIN

NEBRASKA

West Sidney Area Oil Discovery Being Completed

Ohio Oil Co. is installing pump at 1 Fleming, NE NE NW 28-13n-50w, in the West Sidney area, Cheyenne County. The well made 76½ bbl. of oil from "D" sand in 30 minutes of swabbing. Production was from the zone 4,798-4,826 ft.

The well is within the area generally considered the West Sidney gas area, where both "D" and "J" sands have produced gas. "J" sand was tested for a flow of 3½ million cu. ft. of gas per day. Completion as an oil producer from "D" sand will be the first oil production in the area.

NORTH DAKOTA

Deep Beaver Lodge Wildcat Flows

Amerada Petroleum Corp. reported a flow of 492 bbl. of oil per day on test of 2 Kvam, C SW NE 19-156n-95w, deep wildcat in Beaver Lodge field, Williams County. Production is from perforations 10,390-10,445 ft. in Jefferson of Devonian age, and test wax through 22/64 and 15/64-in. chokes. Another test of the same zone produced 41 bbl. of oil in 2¾ hours through ¼-in. choke. Oil is 38.8° gravity.

Charlson Extension Flows

A McKenzie County extension to the producing area in Charlson field flowed 382 bbl. of oil in 16 hour test from Madison at 8,395-8,439 ft. Test was through ¼-in. choke with tubing pressure of 1,000 psi. The well is Amerada Petroleum Corp.'s 1 Government-Fruh, C SW SW 34-154n-95w, ¾ of a mile southwest production at 1 Yttredahl, C SW NE 33-154n-95w, which was completed for a gage of 142 bbl. per day. The gage at 1 Government-Fruh is the best to data on the southern portion of the Nesson anticline. Amerada will perforate and test a higher zone prior to completion.

New Williams County Pool Indicated

Amerada Petroleum Corp. recovered oil on test of the Mission Canyon for an apparent new pool discovery 3 miles south of the Beaver Lodge field. The well is 1 North Dakota F, C NW NW 36-155n-96w. On 4-hour test on the zone 8,317-57 ft. the well flowed 12.6 bbl. of oil and the operator reversed out 21.8 bbl. Oil is 38.5° gravity. Flowing pressure was 1,060-1,180 psi.

Amerada is reported drilling ahead, with plans to set pipe at about 8,457 ft. for production tests. The discovery is about halfway between Beaver Lodge and Hofflund fields, and is about 1¾ miles northeast of The California Co.'s 1 Kamp, NW NE 3-154n-96w, completed as a failure several prior to the discovery of oil in the state.

Slight Shows Reported at Dunn County Wildcat

Carter Oil Co. reported shows in samples from the interval 8,534-50 ft. at 1 Lockwood, C SE SW 5-147n-93w, in the Carsin area of Dunn County. Drill-stem test 8,531-49 ft. failed and Carter was last reported attempting a second test. Charles salt at 8,348 ft. is the last top reported.

SOUTH DAKOTA

Shell Testing at Harding County Potential Discovery

Shell Oil Co. is swabbing intermittently with recovery of varying amounts of oil and water. Recoveries on most recent tests are reported as ungaged. On 2 days of intermittent swabbing through perforations 8,715-28 ft. recovery was 162 bbl. of oil and 96 of water. The operator plans to set bridge plug and perforate a higher zone for further testing. Both shows in the wildcat, 1 State A, C SW SE 9-21n-4e, which promises to be the state's first producer were in the Red River of Ordovician age.

MONTANA

Cabin Creek Confirmation Testing

Shell Oil Co. is coring below 8,790 ft. at 11-33 NPRR, SE NW NW 33-10n-58e, second well in the Cabin Creek area, Fallon County. The test is being watched with considerable interest, and is of importance to eastern Montana operators since the discovery well was rated by Shell as capable of 4,235 bbl. per day from two zones only, with shows in Charles and Madison not tested.

In the current well a test 8,602-32 ft. recovered 90 ft. of gassy mud with pin points of oil in 2½ hours. Another test 8,632-8,712 ft. made 300 ft. of gassy mud in the same length of time. Flowing pressure was 150 psi. Tops are not reported by the operator. Production in the discovery was from Silurian and Ordovician.

WYOMING

Fifth Producing Zone Tested at Happy Springs

Sinclair Oil and Gas Co. has completed 23 Unit, NE NE SW 4-28n-93w in the Happy Springs field, Fremont County as a Phosphoria discovery. The well produced through perforations 6,158-90, 6,120-24, and 6,234-84 ft. after acidization. Open flow potential is 1,924 bbl. of oil per day. Flow prior to acid treatment was 178 bbl. of oil in 24 hours. Oil is 30.5° gravity. Previous production in the field is from Frontier, Muddy, Dakota and Lakota.

Carbon County Wildcat Testing Oil Show

McElroy Ranch Co., Natural Gas & Oil Co., and Bruce Anderson, Casper independent, are preparing to drill-stem test of a 9-ft. interval from which saturated core was recovered at 1" Horne, SW NW NE 11-20n-79w. Core was cut 5,700-10 ft. Top 1 ft. was shale, with the remaining 9 ft. saturated sand with good porosity, permeability, and even stain and fluorescence. The well is south of Big Medicine Bow field. It previously showed for commercial gas production from the Sussex member of the Steele.

Madison Production Possible For Beaver Creek Field

Stanolind Oil & Gas Co. is coring below 11,293 ft. at 30-M, S½ S½ NW NE 10-33n-96w in the Beaver Creek field, Fremont County, after recovering some oil on drill-stem tests of two zones in Madison. The deep wildcat recovered 50 ft. of 40°-gravity oil with 70 ft. of oil-cut mud on test 11,185-11,243 ft. A second test 11,243-11,293 ft. made 30 ft. of oil. Top of Madison was found at 11,189 ft. If successful, the deep test will add Madison as the sixth producing zone in the field. The pool has not previously been tested below Tensleep.

COLORADO

Casing Run on Baca County Wildcat

Amerada Petroleum Corp. and British-American Oil Producing Co. have landed casing at 1 Neu, SE SE NW 33-32s-41w, Baca County, in southeastern Colorado. No cores, tests or shows were reported to the present depth of 3,405 ft., and casing was landed at 3,403 ft. The operators will perforate and test several sections. Topeka was topped at 2,960 ft. and Lansing at 3,225 ft.

The well is one of three recent wildcats drilled in this county following exploratory interest growing out of the westward movement of Anadarko basin exploration in Kansas and Oklahoma.

Third Urado Area Wildcat Abandoned

Continental Oil Co. and English Oil Co. have abandoned the third test of the Urado block in Rio Blanco County. The third failure, 3 Government, NW NW NE 23-3s103w, went to a total depth of 2,814 ft. Tops and other details have not been reported. It was the final well in a series of tests projected to Mancos, with considerable interest also in Mesaverde possibilities because of previous successes in this formation along the east side of Utah and in southwestern Wyoming.

A deeper test of this block, to Pennsylvanian, is a possibility, although the operators have announced no decision to date.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Atascosa County: H. H. Howell 1 Tom, John Benson Sur. 148, A-72. Shut down. TD 3,647 ft.

Bastrop County: Smith & Joslyn 1 Hanna, James B. Ballock Sur. Dry. TD 2,300 ft.

Duval County: Don H. Marsh 1 Leopoldo Garcia, Tract 1, Share 6, Santa Cruz de la Concepcion Grant, A-173. Dry. TD 2,653 ft.

Don H. Marsh 1-B Leopoldo Garcia, Share 10, Santa Cruz de la Concepcion Grant, A-173. Dry. TD 2,703 ft.

Superior Oil Co. A Atlee Parr, Blk. 53, Wheeler-Splane Subd., San Andres Grant, A-657.

Edwards County: Slagter Oil Co. 1 Whittenburg, Sec. 63, Blk. 3, GWT&P Sur. Dry. TD 8,900 ft.

Frio County: Barry & Moore 1 Farfarson, Jose Trevino Sur. 551. Dry. TD 2,256 ft.

WILDCAT COMPLETIONS

Gonzales County: Sutton Drilling Co. 2 Robinson, James Gibson Sur. Dry. TD 2,313 ft.

Hidalgo County: Jake L. Hamon 1 Drawe, Lot 15, Sec. 39, Capisallo District Subd., Santa Maria Grant. IP 11.04 BOPD, 12/64-in., 44°, casing perforations 7,726-27 ft. TD 8,091 ft. (New field—Donna.)

Jim Hogg County: George H. Coates 2 Silver Lakes, Inc., Share 1, Las Vivoritas Sur., A-226. Dry. TD 4,323 ft.

Kleberg County: The Texas Co. 1 State Tract 82, Cayo del Grullo Sur. IP 4,350 M.c.f. daily, open flow, casing perforations 11,430-46 ft. TD 13,016 ft. (New field.)

LaSalle County: J. E. Mowinkle 1 Perrow, HGN Sur. 40, A-424. Dry. TD 5,205 ft. Plymouth Oil Co. 1 M. Cartwright, Jr., H&GN Sur., A-298. Dry. TD 5,664 ft.

McMullen County: J. R. Butler 1 Hays-Ezell, P. Fadden Sur., A-4, and T. Adams & J. Scanlon Sur., A-12. Dry. TD 1,605 ft.

Theo Hamm Brewing Co. 1 Dickinson, Sec. 17, HT&B Sur., A-273. Dry. TD 6,010 ft.

Hawn Brothers 1 Martin and Fryette, AB&M Sur. 39, A-20. Dry. TD 3,513 ft.

Nueces County: Southern Minerals Corp. and Magnolia Petroleum Co. 1 Johnson, Sec. 125, George H. Paul Subd., Driscoll Ranch. IP 31.75 BOPD, 9/64-in., 41.9°, casing perforations 5,398-5,408 ft. TD 7,014 ft. (New field—Southeast Clara Driscoll.)

Starr County: C. G. Glasscock and Humble Oil & Refining Co. 1 Neblett, Blk. E, Share 6, "B" Subd., El Benadito Grant. IP 29.12 BOPD, ¾-in., 42°, casing perforations 5,352-53½ ft. TD 5,684 ft.

Zapata County: Sam Krasner et al 1 Tiblier, Share 3, Porcion 14. Dry. TD 2,736 ft.

TEXAS GULF COAST

Bee County: Tri-Mark Oil Co. 1 Miller, A. B. Dickson Sur., A-159. Dry. TD 4,515 ft.

Brazoria County: Getcher, Cole & Johnson 1-A Poole, T. and W. Alley Sur. Dry. TD 714 ft.

Fayette County: Gilcrease Oil Co. 1 Rightman, Jesse Bartlett Lge., A-10. Dry. TD 2,797 ft.

Fort Bend County: F. H. Carpenter et al 1 Herman Hospital estate, Jesse H. Cartwright Sur., A-6. Dry. TD 8,515 ft.

Galveston County: Gulf Coast Leaseholds, Inc., 1 Ross unit, S. F. Austin Lge., A-3. IP 32.59 BOPD, 5/64-in., 40.5°, casing perforations 9,920-25 ft. TD 10,165 ft. (New pay in North League City field.)

The Texas Co. 1 Eggers Gas Unit O/A, A. G. Reynolds Sur., A-21. Dry. TD 14,604 ft.

Goliad County: W. C. McBride, Inc. et al 1 Willms, Squire Burns Sur., A-69. Dry. TD 8,450 ft.

Hardin County: American Republics Corp. and Houston Oil Co. of Texas 5 Hampton, A. Hampton Sur., A-30. IP 59.51 BOPD, 6/64-in., 43°, Yegua 7,635-38 ft. (casing perforation). TD 8,148 ft. (New pay in Hampton field.)

J. P. Owen 1-E Doty-Jackson, Lot 13, W. N. Cox Lge., A-13. Dry. TD 7,465 ft.

The Texas Co. 1 Ogden fee, NCT-3, Mary E. Hopkins Sur. 1, A-779. IP 91.08 BOPD, 12/64-in., 33.8°, Yegua 6,684-92 ft. (casing perforations). TD 7,500 ft. (New pay in West Saratoga field.)

Harris County: R. W. Ramey 1 Blackman et al, T. Martin Sur., A-552. Dry. TD 6,010 ft.

Charles B. Wrightsman and Pat Rutherford 1 Harris County Land & Development Co., Victor Blanco Sur., A-2. IP 14,200 M.c.f. daily, open flow, Yegua 7,841-45 ft. (casing perforations). TD 9,048 ft. (Extends, and new pay in Dooley field.)

Jackson County: Gray Wolfe Co. 14-Way Ranch, Peter Aldrich Sur., A-2. Dry. TD 9,020 ft.

Jasper County: American Republics Corp. and Houston Oil Co. of Texas 2 Fletcher, W. A. Fletcher Sur., A-676. IP 27.60 BOPD, 8/64-in., 43.8°, Yegua 7,238-46 ft. (casing perforations). TD 8,100 ft. (New pay in West Castillo field.)

Karns County: Armstrong & Horn 1 Dzuik, Bartlett Hickman Sur., A-35. IPP 15 BOPD, 30.5°, casing perforations 3,939½-41½ ft. TD 4,200 ft. (New field—Dzuik.)

Edwin L. Cox 1 Krawietz, A. Hernandez Grant, A-4. Dry. TD 6,028 ft.

Live Oak County: Argo Oil Corp. 1 Baker et al, Seale & Morris Sur. 6. Dry. TD 10,350 ft.

Daubert & Achning 1-G Wadem Alonzo Blair Sur., A-79. Dry. TD 5,037 ft.

Oil Corp. 1 Knight, J. R. Johnson Sur., A-263. Dry. TD 3,990 ft.

Matagorda County: Fidelity Oil & Royalty Co. and Houston Natural Gas Production Co. 1 Doman et al, Henry Harrison Sur., A-46 and A-47. Dry. TD 9,515 ft.

Spartan Drilling Co. et al 1 Hamlin, Section 13, John Duncan Sur., A-140. Dry. TD 9,449 ft.

Orange County: K. D. Owen 1 Summers et al, Alexander McIver Sur., A-135. Dry. TD 8,700 ft.

Refugio County: L. G. Shelly 1 Haynes, James Power and James Hewitson Sur., A-53. Dry. TD 7,233 ft.

Sam E. Wilson, Jr., and Jay Callahan 1 Tatton, Blk. 90, Hanna Knighton Sur., A-205. Dry. TD 8,525 ft.

Victoria County: W. H. Cocke and R. H. Goodrick 2 Kohutek, SA&MG Sur., A-316. Dry. TD 650 ft.

Gulf Oil Corp. 2 Sophie Brown, IRR Sur. 12, A-435. IP 6,500 M.c.f. daily, open flow, casing perforations 8,527-79 ft. TD 9,262 ft. (New field.)

Wharton County: Theo Hamm Brewing Co. 1 Bodungen, WCRR Sur. 51, A-378. Dry. TD 3,030 ft.

Bernard Rosmartin, trustee, 1 Bender et al, D. B. King Sur. 16, A-601. Dry. TD 6,330 ft.

Lloyd H. Smith, Inc., and Wood Klep & Co. 1 Harfst, Lyman Conkrite Lge., A-16. Dry. TD 5,500 ft.

EAST TEXAS

Henderson County: W. C. Windsor 1 Liddie E. Scurlock Burkhart, W. F. Atwood Sur., A-1019, 2 mi. SW LaRue. Dry. TD 5,523 ft.

Limestone County: O. W. Killam 1 R. L. Namce, J. D. Brown Sur., A-51. Dry. TD 6,580 ft.

Upshur County: Coats Drilling Co. 1 Gage, M. H. Pulvador Sur., A-5. Dry. TD 5,016 ft.

WEST CENTRAL TEXAS

Brown County: R. F. Caraway 1 Alice Graves, Sec. 26, BBB&C Sur. Dry. TD 1,045 ft.

G. J. Morgan 2 Thompson, 86-6-T&P. Dry. TD 2,056 ft.

Callahan County: Gilchrist Drilling Co. 1 E. C. Hays, Sec. 67, BBB&C Sur. Dry. TD 2,197 ft.

A. T. Halbert 1-B Dyer, Sec. 57, BBB&C Sur. Dry. TD 1,840 ft.

Rhodes Drilling Co. and Ted Weiner 1 Dyer, Sec. 58, G. W. Riley Sur. Dry. TD 3,955 ft.

Coleman County: O. P. Leonard 1 Harris, Sec. 17, GH&H Sur. Dry. TD 1,205 ft.

J. W. Marshall 2 Eubanks, J. Scott Sur. 665. Dry. TD 1,949 ft.

D. E. Vasser 1 McCulloch, Sec. 744, M. Lappe Sur. Dry. TD 2,110 ft.

Eastland County: E. J. Briback and C. H. Flowers 1 Merrell, 12-2-ETRR. Dry. TD 1,025 ft.

Fisher County: R. M. Bass 1 Hill, 192-1-BBB&C. IP 229 BOPD, 20/64-in., 40°, pay 4,557 ft. TD 4,710 ft.

Haskell County: Merle F. Gunby 1 Yarbrough & Russell, 160-45-H&TC. Dry. TD 5,008 ft.

Sojourner Drilling Co. 1 Laura Clark, 7-2-H&TC. Dry. TD 5,835 ft.

Jones County: C. U. Bay 1-C Dunagan, 16-17-T&P. IP 98 BOPD, 16/64-in., 45°, Swastika perforations 2,865-80 ft. TD 2,951 ft.

Thos. D. Humphrey & Sons 3 Foster, Sec. 26, D&DA Sur. Dry. TD 2,841 ft.

Needl & Hood Drilling Co. 1 Schoonmaker, 2-5-H&TC. Dry. TD 2,240 ft.

Ungren & Frazier et al 1 Prichard, G. Martinez Sur. 195. Dry. TD 3,142 ft.

Nolan County: Drilling & Exploration Co. 1 Sliger, 181-64-H&TC. Dry. TD 5,200 ft.

Shackelford County: H. W. Lee and George A. Hughes, Jr. 1 Davis, 4-13-T&P. Dry. TD 1,802 ft.

Sojourner Drilling Co. 1 Hendrick, Sec. 129, ETRR Sur. IPP 65 BOPD, 40°, pay 1,409 ft. TD 1,431 ft.

Wilcox Investment Co. 1 Morris, Sec. 166, ETRR Sur. Dry. TD 1,745 ft.

Wilcox Investment 1-E Morris, C. C. Bruff Sur., Blk. 22. Dry. TD 1,980 ft.

Stephens County: E. B. Fletcher 1 Brooker, 44-7-T&P. IPP 189 BOPD, 41°, Lake sand 3,483 ft. TD 3,710 ft.

F. L. Hafner 1 Gray, 79-4-T&P. Dry. TD 2,263 ft.

NORTH TEXAS

Archer County: Archer Drilling & Production Co. 1 Hasson, Blk. 102, J. W. Harris Subd. IPP 41 BOPD, 40°, pay 1,274 ft. TD 1,276 ft.

W. A. Lofton and Denman Oil & Drilling Corp. 1 Dycus, Sec. 1895, TE&L Sur., A-575. Dry. TD 3,110 ft.

Osage Exploration Co. 1 Duckworth, Sec. 6, J. Llewellyn Sur., A-256. IPP 72 BOPD, 42°, Caddo pay 4,830 ft. TD 5,298 ft.

Harry F. Snebold 1 Cowan-McKinney, Blk. 177, R. Carson Sur., A-447. Dry. TD 1,530 ft.

Baylor County: Y-B Drilling Co. 1-B Murrell Mills, TE&L Sur. 2413. IPP 70 BOPD, 39°, upper Gardner sand 1,380 ft. TD 1,386 ft.

Grayson County: R. E. Hibbert 1 Alton Short, J. Coryell Sur., A-261, 1½ mi. SW Big Mineral Creek field. IP 34,000,000 cu. ft. of gas, plus 60 bbl. distillate per 1,000 M.f.g., 10/64-in., pay perforated 7,847-90 ft. TD 7,933 ft.

Jack County: L. T. Burns 1 Covington, Sec. 2, H&GN Sur., A-994. IPP 85 BOPD, 41°, pay 3,812 ft. TD 3,836 ft.

Knox County: Seaboard Oil Co. 2 Hamilton, 20-13-H&TC. IPP 98 BOPD, 37°, perforated Tannehill sand 2,505-09 ft. TD 2,510 ft.

Wilbarger County: Fortex Oil Co. 2-A Waggoner Estate, 11-14-H&TC. Dry. TD 2,553 ft.

Clay Neal 1-H Waggoner, 4-5-H&TC. Dry. TD 2,440 ft.

Young County: Darden & Self 2 Self, Blk. 75, TE&L Sur. Dry. TD 1,112 ft.

J. V. Teague et al 1 Norton, Blk. 620, TE&L Sur. IPP 12 BOPD, pay 488 ft. TD 494 ft.

WEST TEXAS

Coke County: William and A. P. Fuller 2 Johnson, 67-2-H&TC. IP 260 BOPD, 43°, pay 6,518 ft. TD 6,690 ft.

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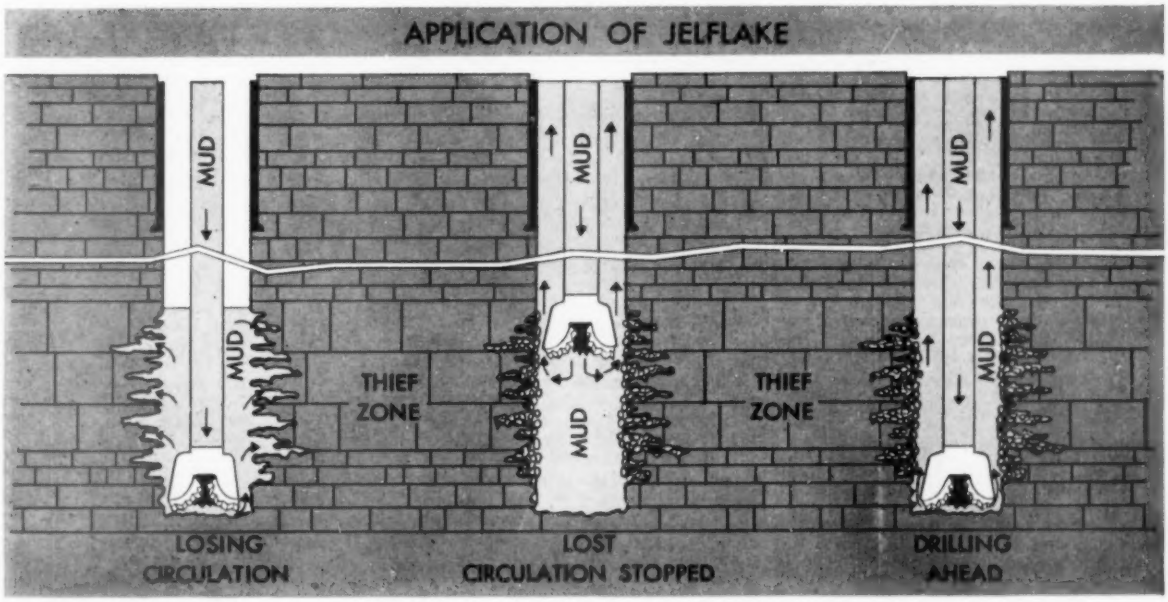

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WILDCAT COMPLETIONS

Crane County: Union Oil Co. of California 1 Wright, 68-X-CCSD&RGNG. Dry. TD 6,448 ft. Elev. 2,451 ft., Devonian 6,345 ft.

Culberson County: Grisham-Hunter Corp. 2 Grisham-State, 8-60-T5-T&P. Dry. TD 3,955 ft. Elev. 3,721 ft., Delaware lime 1,358 ft., sand 1,398 ft.

Floyd County: Sinclair Oil & Gas Co. 1 Massie, 7-T-BS&F. Dry. TD 10,358 ft. Elev. 3,203 ft., Wolfcamp 5,290 ft., Pennsylvanian lime 8,600 ft., Mississippian 9,572 ft.

Hockley County: William Herbert Hunt 1 Glimp, 12-700-State Capitol Lands Sur., A-134. Dry. TD 9,158 ft. Elev. 3,660 ft., Ellenburger 9,115 ft.

Lamb County: The Texas Co. 1-98 Union Compress, 12-664-State Capitol Lands Sur. IPP 116 BOPD, 28°, pay perforated 3,952-84, 4,000-20 ft. TD 9,842 ft. Elev. 3,567 ft., Mississippian 9,200 ft., Ellenburger 9,670 ft.

Pecos County: Wilcox Investment Co. 1 Barnes, 140-10-H&GN. Dry. TD 2,900 ft.

NEW MEXICO

Rio Arriba County: Stanolind Oil & Gas 1 E. C. Valdez, NW SE NE 32-28n-4w. Temporarily abandoned. TD 6,460 ft.

Sandoval County: Lowry et al 1 Renkoff "D" NE SW 17-19n-4w. IPP 111 BO in 46 hours. Mesaverde discovery—new field. Gibson 1,185 ft. TD 1,685 ft.

ILLINOIS

Clay County: Walker Drilling Co. 1 Taylor, NE NW SE 25-4n-8e. Dry. TD 3,155 ft.

Clinton County: L. Monken 1 Zachry, NW NE SE 4-2n-3w. Dry. TD 998 ft.

Coles County: G. E. Quick 1-A Fender, NW NW NE 17-12n-14w. Dry. TD 350 ft.

Crawford County: H. Brinkley 1 Goodwin, SE NW NW 8-5n-10w. Dry. TD 899 ft.

Central Drilling Co. 1 Jones, SE SW SW 19-6n-11w. Dry. TD 1,614 ft.

Gallatin County: T. S. Doran 1 Shain, SW SW 19-7s-8e. Dry. TD 3,057 ft.

Jasper County: H. F. Robinson 1 Houser, SE NE NW 17-8n-10e. Dry. TD 2,585 ft.

Lawrence County: Theodore G. Glass 1 Saums, SE NW SE 9-2n-12w. Dry. TD 2,285 ft.

Marion County: T. M. Conrey 1 Adams, NW NW NE 7-3n-1e. Dry. TD 1,648 ft.

J. E. Turner 1 Britt, NW NE SW 3-3n-1e. Dry. TD 1,721 ft.

Wabash County: George & Wrather 1 Hill, SW NW SW 25-1s-14w. Dry. TD 2,989 ft.

Washington County: Milton Lobree 1 Richards, NW SE SW 9-3s-4w. Dry. TD 2,587 ft.

I. V. Horton 1 Eigenrauch, NE NW NW 36-3s-4w. Dry. TD 2,765 ft.

INDIANA

Daviess County: Marion Chapman 5 Graber, SE NE SE 33-3n-5w. Dry. TD 738 ft.

Dubois County: Grant Mullinax 1 Jochin, NW NW NW 18-1s-4w. Dry. TD 575 ft.

Ted Uland 1 Vollmer, NE NW NW 20-1s-4w. Dry. TD 532 ft.

H. R. Burton 1 Knies, NE SE NE 10-2S-4w. Dry. TD 616 ft.

Parke County: Reed & Able 1 Poletto, NW SW NW 4-16n-8w. Dry. TD 1,100 ft.

Pike County: Bert Cheatham 1 Thomas, NW NW NE 26-1n-7w. Dry. TD 1,291 ft.

Posey County: C. E. O'Neal & Co. 1 Glass, NE NW SE 13-5s-12w. Dry. TD 2,428 ft.

Spencer County: E. F. Moran 1 Montgomery, SW NE SE 32-7s-7w. Dry. TD 1,445 ft.

Walter Sargent 1 Crandall, NE SE NE 25-6s-6w. Dry. TD 1,508 ft.

Vigo County: Great Lakes Carbon 1 Sparks, NE NW SW 2-10n-9w. Dry. TD 1,208 ft.

KENTUCKY

Daviess County: George A. Hoffman 1 Fulkerson, SE NE SE 17-O-26. Dry. TD 2,416 ft.

Henderson County: G. W. Greer 1 Cates, CEL SE NW SE 10-O-22. Dry. TD 1,787 ft.

Clarence Wood-Lohman 2 Royster, NW SE NW NW 1-P-21. Dry. TD 2,751 ft.

Hopkins County: Delta Drilling Co. 1 Adams, NE NW SE NE 19-L-24. Dry. TD 3,319 ft.

Meade County: Vickers and Thrasher 1 Miller, E½ NW SE NE 22-R-40. Dry. TD 1,010 ft.

Muhlenberg County: Hawley and Bird 2 (3) Grace, SW SW NE SW 15-H-29. Dry. TD 1,016 ft.

J. C. Miller and Ashland Refining Co. 1 Ky.-Midland Coal Co., NE SE NW NW 5-J-28. Dry. TD 2,529 ft.

MICHIGAN

Hillsdale County: Pure Oil Co. 1 Myers, NW SE NW 10-7s-3w. Dry. TD 1,258 ft. in Traverse lime.

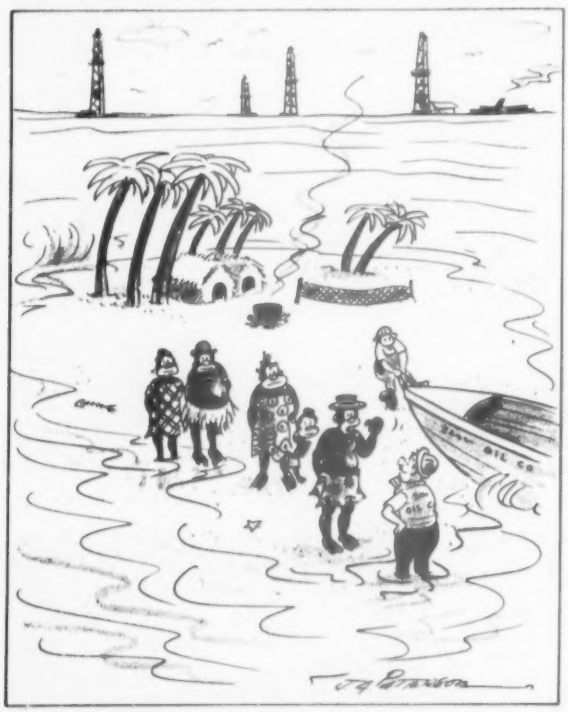
Kalkaska County: Dow Chemical Co. 1 Dow-State-Garfield P. M., C SE SE 16-25n-6w. Dry. TD 3,292 ft. in Dundee.

Muskegon County: Fisher-McCall Oil & Gas, Inc. 1 Zeller, NE SE NE 17-9n-15w. Dry. TD 1,998 ft. in Traverse lime.

Newaygo County: John F. Melvin 1 Strutzel, NW NW NW 32-12n-13w. Dry. TD 2,247 ft. in Traverse lime.

GEORGIA

Glynn County: E. B. La Rue et al 1 Massey, unsurveyed land in Latitude 31° 6' 45"



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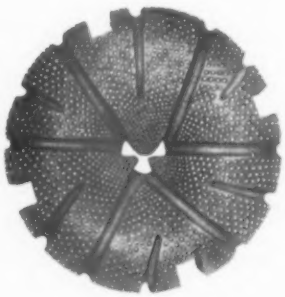

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WILDCAT COMPLETIONS

north and Longitude 87° 31' 45" west. Dry. TD 4,615 ft.

ALABAMA

Escambia County: Clinch Drilling Co. 1 Huxford, SW SW SW 20-2n-9e. Dry. TD 6,342 ft. Elev. 251 ft., Wilcox 1,316 ft., marine Tuscaloosa 5,551 ft., lower Tuscaloosa 5,730 ft., Massive 5,879 ft., lower Cretaceous 6,120 ft.

MISSISSIPPI

Adams County: Sunnyland Contracting Co. 1 Adams County Board of Supervisors, 5-7n-3w. Dry. TD 6,523 ft. Elev. 67 ft., Wilcox 3,853 ft., Baker 5,682 ft., Parker 5,718 ft.

Jefferson County: Austral Oil Exploration Co. 1 Phillips, 9-10n-2w. Dry. TD 9,271 ft. Elev. 84 ft., lower Tuscaloosa 9,120 ft.

SOUTH LOUISIANA

Calcasieu Parish: Lion Oil Co. 1 Reeds, 2-11s-8w. Dry TD 10,802 ft.

Cameron Parish: Howell, Holloway & Howell 1 Hebert-Helms, 35-12s-7w. Dry. TD 11,094 ft.

The Texas Co. 53 State Lease 50-East Hackberry, Township 12-9w, in Calcasieu Lake. IP 292 BOPD, 10/64-in., 32.4°, casing perforations 10,927-41 ft. TD 11,167 ft. (New pay in East Hackberry field).

Jefferson Davis Parish: H. L. Hunt and American Republics Corp. 1 Powell, 11-8s-6w. Dry. TD 11,277 ft.

Lafourche Parish: John W. Mecom 6 Greene, 2-17s-22e. IP 334 BOPD, 10/64-in., 32.1°, casing perforations 10,573-76 ft. TD 11,405 ft. (New pay in West Delta Farms field).

Plaquemines Parish: Texas Gulf Producing Co. 1 Ballowe, 4-17s-26e. Dry. TD 11,973 ft.

Pointe Coupee Parish: Bateman Drilling Co. 2 Callicott, 69-6s-9e. Dry. TD 10,650 ft.

St. Martin Parish: Continental Oil Co. 1-B Jeanerett, 11-13s-11e (Bayou Long area). IP 480 BOPD, 12/64-in., 31.7°, casing perforations 11,930-40 ft. TD 13,205 ft. (New field).

St. Mary Parish: Texas Crude Oil Co. 1 Foster, 2-14s-9e. IP 3,000 M.c.f. daily, 14/64-in., casing perforations 10,729-31 ft. TD 12,456 ft. (New field).

Terrebonne Parish: Union Producing Co. and Texas Gulf Producing Co. 1-D La Terre, 27-19s-16e. Dry. TD 14,471 ft.

Vermilion Parish: Magnolia Petroleum Co. 1 Miller, 6-14s-1e. IP 85.5 BCPD with 2,160 M.c.f. daily, 10/64-in., 51.6°, casing perforations 11,498-505 ft. TD 12,303 ft. (New pay in Outside Island field).

NORTH LOUISIANA

Bossier Parish: Robert S. Haynes et al 1 O'Daniel, near NWc 7-23n-12w. Dry. TD 6,357 ft.

Claiborne Parish: Republic Natural Gas Co. 1 Martin-Crain unit, 50 ft. NE of C SE 27-23n-6w. IPF 290 BOPD, Smackover lime 10,107-120 ft., 51.2°, 10/64-in., TD 10,482 ft. (Opens Colquitt field.)

Concordia Parish: Brooks, Justiss-Mears 1 Conn "A," near SWc 34-5n-6e. Dry. TD 7,159 ft.

Crow & Olin 1 Bullis-Conn, near SWc 46-3n-8e. Dry. TD 7,115 ft.

Grant Parish: Carl L. Bryan et al 1 Futrell-Cain, near C SW SE 36-7n-1w. Dry. TD 5,221 ft.

Union Parish: James F. Morse et al 1 Tillman, near NWc 7-23n-2w. Dry. TD 4,135 ft.

ARKANSAS

Woodruff County: Magnolia Petroleum Co. 25 core test, 2,500 ft. S and 290 ft. E of NWc 19-7n-1w. Dry. TD 1,780 ft.

Magnolia 22 core test, near NWc 7-8n-2w. Dry. TD 1,267 ft.

Magnolia 23 core test, near SEc 11-8n-3w. Dry. TD 1,166 ft.

Magnolia 24 core test, near NEc 24-8n-3w. Dry. TD 1,450 ft.

OKLAHOMA

Caddo County: Huffman & Malloy 1 Oswald, SW NW NW 16-6n-12w. Dry. TD 2,504 ft.

Carter County: Cumbie & Collings Drilling Co. 2 Luster, SE NE SE NW 17-1s-2w. IPP 7 BOPD, 854-72 ft. TD 998 ft. (Oil well.)

Creek County: E. L. Oliver 1 McGray, NW NW SW 9-19n-8e. Dry. TD 3,264 ft.

Cimarron County: Colorado Interstate 1 Whisnand, SW SW NE 8-5n-8eCM. IP 4,800 M.c.f. gas per day, Keyes sand 4,759-66 ft. TD 4,812 ft. (Gas discovery.)

Garvin County: Van Grisso et al 1 Jackson, NE NW NE 17-2n-2e. Dry. TD 3,305 ft.

Harmon County: Karl K. Kaempfer 1 Swain, NW NW NW 11-2n-26w. Dry. TD 2,700 ft.

Hughes County: Russell Maguire 1 Shed, NE NE SE 26-6n-9e. Dry. TD 3,215 ft.

Jackson County: H. W. Chamberlain 1 Cecil Booker, NE NE NE 6-1n-18w. Dry. TD 1,505 ft.

Texas Pacific Coal & Oil Co. 1 Lagree, NE NE SW 33-3n-20w. Dry. TD 3,452 ft.

Lincoln County: Foster et al 1 Fisk, SW SW SE 8-14n-3e. Dry. TD 4,485 ft.

Cas. Mee 1 Turner, SE SE SW 22-17n-2e. IPF 108 BOPD, Prue sand 4,119-34 ft.,

(Continued on page 383)

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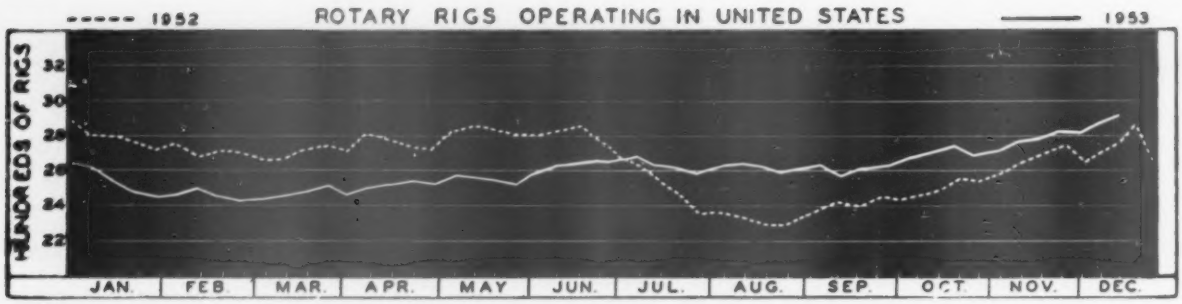
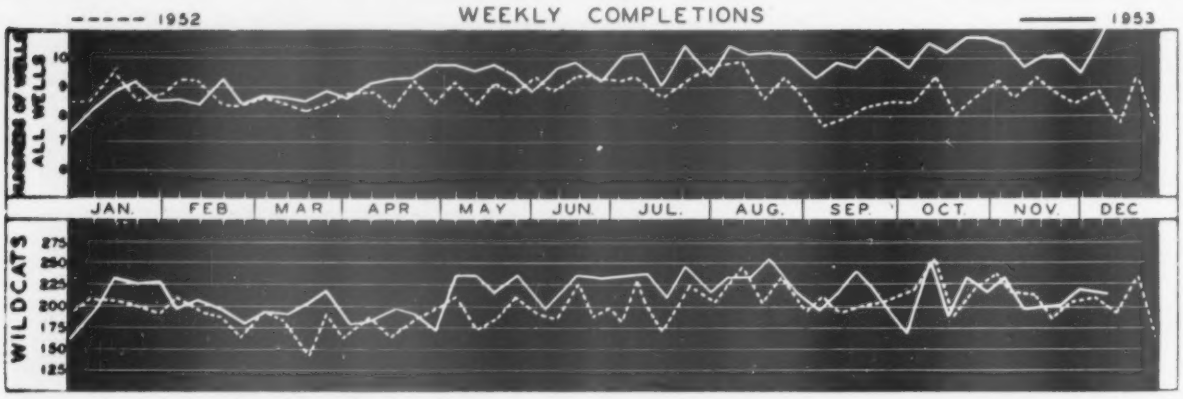




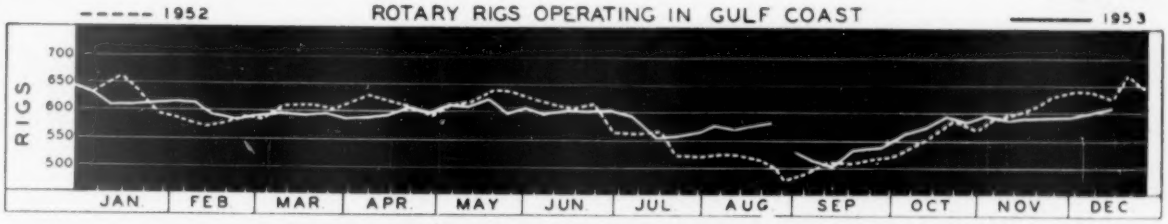
CURRENT STATISTICS

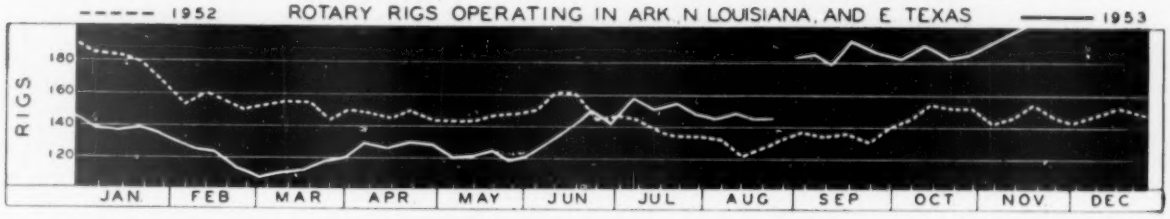
EXPLORATION

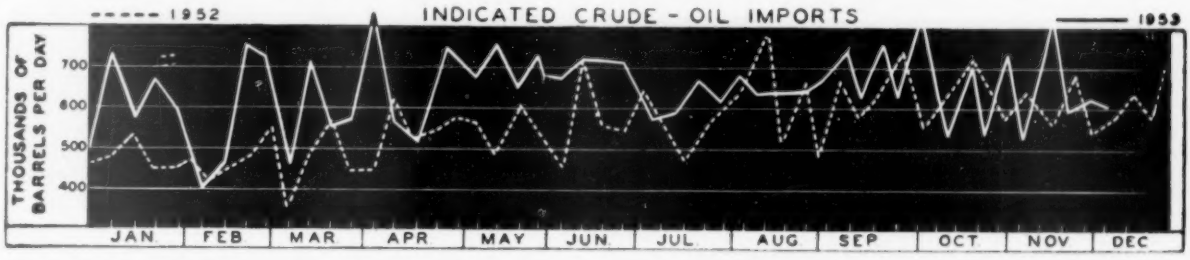
WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 12, 1953

	Total of all wells					Dec. 12		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	22,550	721	736	0	0	0	0	0	0	0	0	0	0
Pennsylvania	39	19	5	†15	86,378	1,824	1,829	0	0	0	0	0	0	0	3	14	17
West Virginia	28	5	16	7	65,067	602	569	0	0	0	0	0	0	0	11	9	20
Ohio	23	14	2	7	52,448	1,012	1,019	0	0	0	0	0	2	0	5	14	21
Indiana	33	7	0	26	42,457	1,270	1,226	0	0	0	10	10	13	0	3	343	358
Kentucky	31	8	10	13	63,338	1,125	1,252	0	0	0	7	7	12	0	1	190	203
Illinois	78	40	1	37	195,476	2,079	2,056	0	0	0	13	13	5	0	0	402	407
Michigan	7	3	0	4	15,212	592	663	0	0	0	4	4	17	0	5	246	268
Kansas	81	37	3	‡41	288,045	4,523	4,314	2	0	0	10	12	88	0	35	712	835
Nebraska	7	6	0	1	40,726	301	271	1	0	0	1	2	17	0	5	124	146
Oklahoma	171	110	5	§56	572,132	7,108	5,499	3	0	1	10	14	112	6	35	563	716
Texas	352	204	14	134	1,533,764	16,233	16,276	21	2	1	69	93	813	60	158	3,978	5,009
North Central (Dist. 7-B & 9)	137	80	1	56	401,300	6,138	5,316	11	0	0	24	35	423	0	17	1,573	2,013
West (Dist. 7-C & 8)	56	41	0	15	321,186	3,528	4,795	2	0	0	5	7	170	2	13	641	826
Panhandle (Dist. 10)	11	9	2	0	38,933	720	601	0	0	0	0	0	0	2	0	20	22
Eastern (Dist. 5 & 6)	21	12	2	7	105,925	764	755	0	0	0	3	3	22	2	5	251	280
Gulf Coast (Dist. 2 & 3)	70	33	4	33	425,696	2,402	2,509	5	1	1	22	29	98	26	66	658	848
Southwest (Dist. 1 & 4)	57	29	5	23	240,724	2,681	2,300	3	1	0	15	19	100	28	57	835	1,020
Louisiana	74	45	5	24	539,070	2,679	2,244	4	1	1	11	17	83	36	21	352	492
Northern	27	15	3	9	109,672	1,194	1,218	1	0	0	5	6	12	2	2	153	169
Southern	47	30	2	15	429,398	1,485	1,026	3	1	1	6	11	71	34	19	199	323
Arkansas	17	7	0	10	61,323	543	391	0	0	0	4	4	12	0	0	125	137
Mississippi	7	4	0	3	45,616	378	336	0	0	0	2	2	20	1	5	164	190
Southeastern States	2	0	0	2	10,957	140	78	0	0	0	2	2	1	0	0	114	115
Montana	16	6	3	7	50,607	429	323	0	0	0	2	2	12	0	0	111	123
Wyoming	25	12	1	12	135,701	815	652	0	0	0	8	8	25	0	3	143	171
Colorado	18	8	1	9	94,803	690	444	0	0	0	7	7	29	0	12	299	340
Utah	6	4	0	2	35,605	70	79	0	0	0	1	1	3	0	4	35	42
New Mexico	19	10	7	2	122,936	1,341	982	1	0	0	1	2	26	1	17	122	166
California	49	39	1	9	212,981	2,429	2,296	2	1	1	9	13	65	1	13	534	613
North Dakota	8	7	0	1	60,558	252	108	0	0	0	1	1	9	0	1	72	82
Miscellaneous (S. D.)	1	0	0	1	5,822	73	128	0	0	0	1	1	1	0	4	45	50
Total United States	1,106	602	74	430	4,353,572	47,229	43,771	34	4	4	173	215	1,365	105	340	8,711	10,521
Total previous week	948	465	55	428	3,716,225			22	2	3	195	222	1,331	101	336	8,538	10,306
Total December 13, 1952	778	349	81	348	3,268,606			18	0	8	167	193	1,300	77	244	8,307	9,928

Service wells included: *7, †12, ‡4, §5.





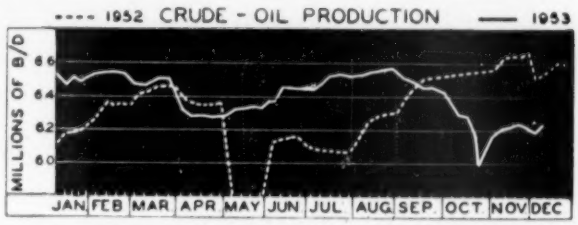


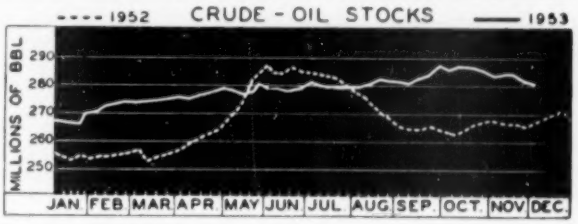
DAILY AVERAGE PRODUCTION FOR WEEK

	December 12 — Crude oil	Lease condensate	Total	Dec. 5 total
Alabama	4,500		4,500	4,500
Arkansas	78,150	650	78,800	80,550
California	1,010,100		1,010,100	1,009,500
Colorado	108,200		108,200	107,500
Eastern	59,500		59,500	59,500
Florida	1,475		1,475	1,475
Illinois	167,200		167,200	168,500
Indiana	32,300		32,300	33,800
Kansas	324,400		324,400	255,300
Kentucky	32,500		32,500	32,100
Louisiana	624,800	40,500	665,300	674,775
North	103,300	3,500	106,800	110,850
South	521,500	37,000	558,500	563,925
Michigan	32,600		32,600	32,800
Mississippi	91,000	3,150	94,150	95,000
Montana	34,100		34,100	32,700
Nebraska	13,900		13,900	13,900
New Mexico	192,800	900	193,700	197,050
Oklahoma	524,900		524,900	527,300
Texas	2,558,050	48,175	2,606,225	2,611,575
Dist. 1	38,575	425	39,000	38,925
Dist. 2	134,975	6,225	141,200	141,800
Dist. 3	412,250	23,650	435,900	437,600
Dist. 4	239,500	6,050	245,550	246,075
Dist. 5	44,350	450	44,800	45,050
Dist. 6	114,100	5,200	119,300	119,625
East Texas field	231,100		231,100	233,350
Dist. 7-B	120,500	50	120,550	119,825
Dist. 7-C	154,925	4,425	159,350	159,525
Dist. 8	807,700	1,400	809,100	809,175
Dist. 9	182,575	250	182,825	183,350
Dist. 10	77,500	50	77,550	77,275
Utah	4,700		4,700	4,700
Wyoming	242,900		242,900	241,500
North Dakota	14,800		14,800	14,600
Total U. S.	6,152,875	93,375	6,246,250	6,198,625
Change from previous week,			up 47,625	
Canada	231,075		231,075	228,550

Total U. S. production January 1-December 12 2,234,617,650 bbl.
Same period last year (crude plus cond.) *2,165,647,840 bbl.

*Includes 29,109,185 bbl. condensate.



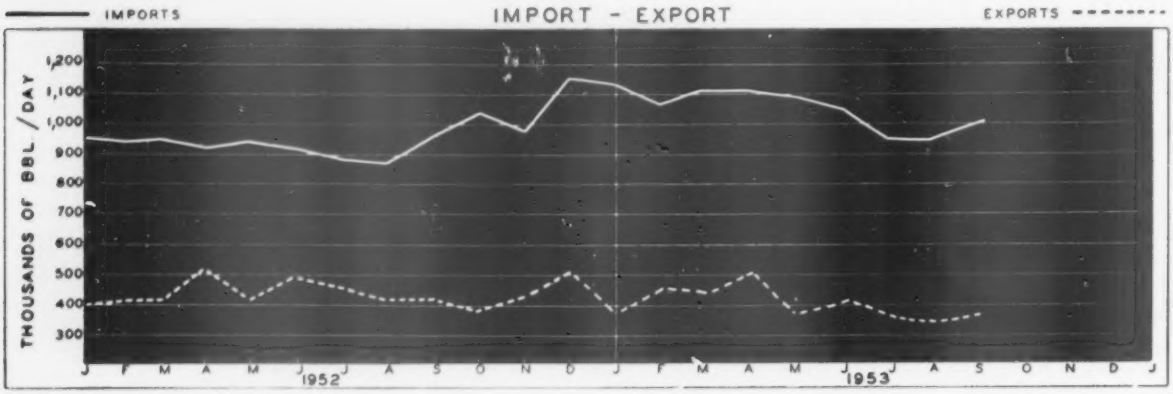


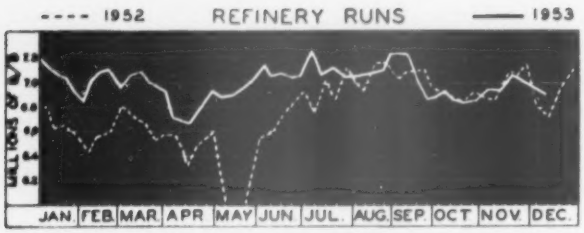
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

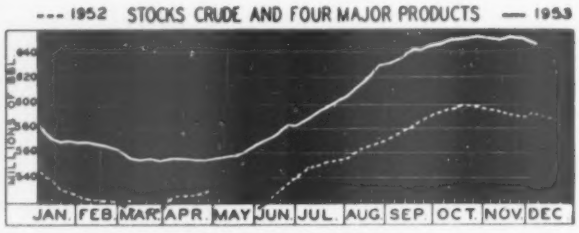
(Thousands of barrels)

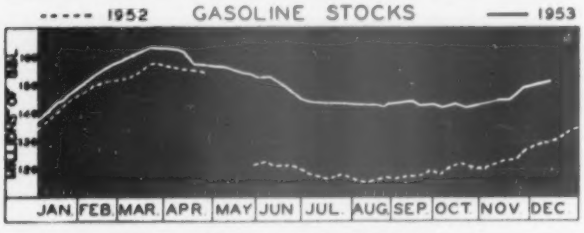
	Dec. 5, '53	Nov. 28, '53	Dec. 6, '52
Pennsylvania Grade	2,696	2,746	2,177
Other Appalachian	1,979	1,800	1,910
Illinois, Indiana, Michigan	12,651	12,508	11,395
Arkansas	3,364	3,344	3,252
Louisiana	17,207	17,869	16,618
North	3,126	3,207	2,441
Gulf	14,081	14,662	14,177
Mississippi	3,231	3,396	2,911
New Mexico	8,461	8,634	7,223
Oklahoma and Kansas	36,785	37,612	37,360
Texas	132,182	132,264	133,239
East Texas	11,531	12,264	11,669
West Texas	57,441	57,295	61,126
Texas Gulf	28,248	28,099	26,625
Other Texas	34,962	34,606	33,819
Rocky Mountain	16,923	16,814	14,648
California	33,584	33,779	30,283
Foreign	†11,465	11,807	7,037
Total	280,528	282,573	268,053

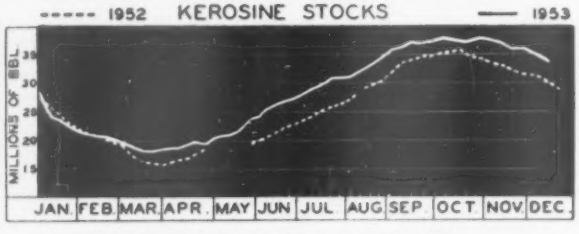
*Bureau of Mines. †Includes 3,986,000 bbl. in California.

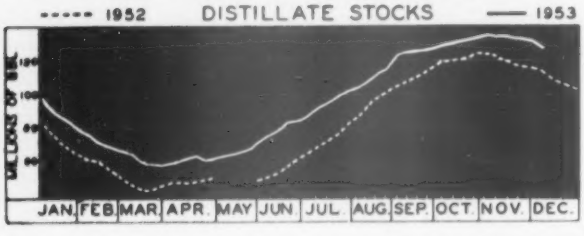


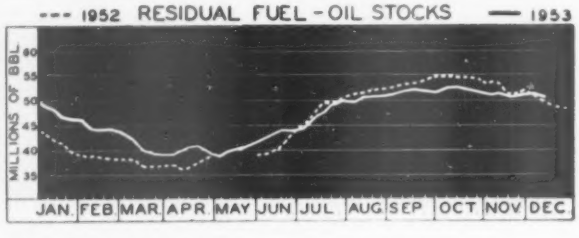










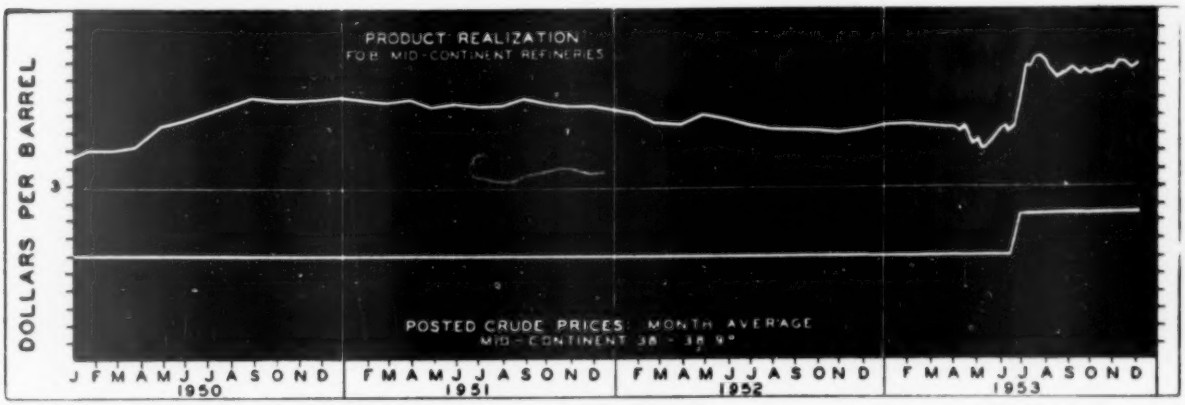


A.P.I. REFINERY REPORT, DECEMBER 12

(Thousands of barrels)

District—	Daily avg. runs	—Daily average production— Gaso.*	Kero.	Dist.	Resid.	—Stocks‡— Gaso.†	Kero.	Dist.	Resid.	—Bureau of Mines, December 1952— Daily avg. runs	—Daily average production— Gaso.*	Kero.	Dist.	Resid.
East Coast	976	431.3	42.1	224.7	215.4	33,375	14,676	47,928	11,642	1,058	441.8	45.2	283.8	247.8
Appalachian:														
District 1	119	53.6	8.0	22.0	11.9	4,162	629	1,525	895	108	48.3	5.9	18.8	14.5
District 2	68	30.9	4.7	12.0	8.0	2,018	607	729	164	94	47.9	7.6	15.0	15.1
Ind., Ill., Ky.	1,298	720.4	78.1	234.1	195.0	30,574	8,626	23,003	4,657	1,289	673.7	100.5	230.7	189.8
Okla., Kans., Mo.	585	354.4	20.0	152.4	43.4	15,982	1,722	11,985	1,290	566	333.2	14.3	139.3	63.9
Inland Texas	238	179.7	10.7	38.4	23.9	5,695	462	2,473	1,387	255	170.0	12.4	40.2	36.9
Texas Gulf Coast	1,701	828.0	140.2	421.2	228.6	22,340	3,847	15,370	6,624	1,717	802.0	139.2	427.3	262.5
La. Gulf Coast	582	296.9	65.6	129.7	41.7	9,297	2,093	6,381	1,751	553	267.9	71.0	123.8	56.4
N. La. and Ark.	64	29.0	5.6	18.6	5.6	3,553	537	979	149	85	34.9	9.8	19.5	7.1
Rocky Mountain:														
New Mexico	19	12.7		2.9	2.9	215		58	29	19	12.4	0.8	2.4	4.1
Other Mocky Mtn.	247	119.4	4.6	56.4	43.3	5,081	270	2,517	939	235	119.1	8.1	46.4	46.8
California	1,018	444.0	7.3	170.4	337.4	20,217	396	13,762	20,928	973	409.3	6.5	161.4	356.7
Dec. 12, 1953	6,915	3,500.3	386.9	1,482.4	1,157.1	152,509	33,865	126,710	50,455	6,952	3,360.5	421.3	1,508.6	1,301.6
Dec. 5, 1953	6,964	3,553.7	381.0	1,380.6	1,232.6	150,098	34,775	130,053	51,073					
Dec. 13, 1952	6,715	3,303.4	421.6	1,501.3	1,282.6	129,582	29,635	109,675	49,881					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.70 for week ended December 5, $3.66 for previous week, and $3.36 for December 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of December 16, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.875-11.5	12.5-13.5	10.75-11.75
Premium gasoline	11.875-12.5	14.0-14.5	12-12.75
42-44 w.w. kerosine	8.875-9.25	10.25-10.4	8.875-9.5
No. 2 straw fuel oil	7.875-8.25	9.25-9.4	8-8.5
No. 6 residual	$1.45-1.55	$2.25-2.40	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.5	5.0	5.25
Grade 18-55	6.6	6.10	6.35

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	13.75
750 vis., No. 3-4 neutral	16.75
2,000 No. 5-6 neutral	18-18.75

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	20.5
200 vis., No. 3 neutral, 0-10 pp.	14.25

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	21.5
180 vis., 10 p.t. neutral	25.5

WAX
Mid-Continent

132-134 A.M.P.	6.0

THE recent reduction in posted gasoline prices on the East Coast was recognition at the tank-wagon level of a weakness that has been evident in the spot market for several weeks. The latest cut in posted prices amounted to 0.2 cent a gallon, effective December 11. The reduction was first announced by Socony-Vacuum Oil Co., Inc., for its marketing area, including 11 eastern states and the District of Columbia. Reductions by other companies extended the area to most of the East Coast.

Soft gasoline markets on the East Coast are reflected in lower prices on the Gulf Coast. Most of the major suppliers are quoting 11 cents a gallon for cargo movement of regular gasoline, but some material is moving at prices as low as 10.75 cents.

Pressure on gasoline prices in the Group 3 area has been developing from some of the exchange agreements between companies on the pipe line and on the river. In some cases river suppliers have delivered more gasoline from river terminals on exchange agreements than they have been able to sell in the pipe-line area. Some of this material has been offered at prices that are well below the normal market along the pipe line. This distress material is exerting additional pressure on the Group 3 gasoline market.

Abnormal weather conditions in the northeastern states have resulted in continuing soft distillate and kerosine markets in the area. Most suppliers have reduced postings for No. 2 fuel to 9.4 cents a gallon for barge delivery in New York Harbor, but spot sales at 9.25 cents have been reported. However, some suppliers believe that a short period of good heating-oil weather would clean up the distress fuel that has been moving at the lower prices.

Heavy fuel continues strong, but some suppliers report that the market has lost some of mad scramble for material that existed through November.

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective September 21, 1953.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.05
Southwest Pennsylvania	3.61
West Virginia	3.55
Ohio	3.54
Illinois Basin	3.02

Make it the Biggest Bonus ever— Give it in U. S. Savings Bonds

If your company is one of the more than 45,000 companies that have the Payroll Savings Plan you *know* what your employees think of Savings Bonds—they spell it out for you every month in their Savings Bond allotments.

If you don't have the Payroll Savings Plan, and are wondering whether your people would like to receive their bonus in Bonds, here are a few significant facts:

—every month, *before they get their pay checks or envelopes*—8,000,000 men and women enrolled in the Payroll Savings Plan invest $160,000,000 in U. S. Savings Bonds.

—the ranks of Payroll Savers are growing: On June 30th sales of $25 and $50 Savings Bonds, the sizes purchased chiefly by Payroll Savers, were 6% and 9% higher than in the corresponding period of 1952.

—Payroll Savers hold their Bonds: 75% of the $7,400,000,000 Series E Bonds which had matured up to June 30, 1953, were being retained by their owners beyond maturity under the automatic extension program.

—on June 30, 1953, the *cash value* of Series E and H Bonds—the kind sold only to individuals—totaled $36,043,000,000, a new high.

It costs no more to give your Christmas Bonus in Savings Bonds. To the Payroll Saver, and to the man who buys his Bonds at a bank (because his company does not provide the Payroll Savings Plan) a One Hundred Dollar Savings Bond looks bigger and better than a check for $75. *Make this a merrier Christmas for every employee. Give the gift that keeps on giving.*

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TULSA 1, OKLAHOMA

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FOR SALE—B & K Pipe Machine with Landis Head, Range 4½" OD to 13" OD w. 7½ HP Westinghouse Motor, mounted with Vee Belt drive with several sets chasers 8 V and 8 Rd. Good condition. Ready to operate. Priced to sell. Fort Worth Pipe and Supply Co., Fort Worth, Texas.

FOR SALE: 3997', 5½", 15#, J-55, Range 3, Spang Seamless Casing. 2500'-3000' rotary rig complete with 2600', 3½" drill pipe. Now drilling. Shira Drlg. Co., Box 467, Eureka, Ks. Ph. 1141.

SPUDDER RIG Bargain. $750.00 no tools. Need money my part drilling shallow proven lease. Or sell part of lease. Box 235, Wagoner, Oklahoma.

USED, EXCELLENT CONDITION

15,000 ft. 6" OD seamless 180/200 wall 16/22' suit. line or shallow wells. 10,000 ft. 4½" OD x 11# line T&C 16/22'. 12,000 ft. 3" OD 4.25# seamless x 20'. 1,500 ft. 20" OD 5/16" wall x 16/22'. Priced to sell.

D. A. MORITZ COMPANY
Braddock, Pa. Br. 1-3700

15,000 FT. WILSON A-1 DRILLING RIG

Complete with 300 joints of 4½" good drill pipe. Bargain. Located West Texas.

Write: Agent, 4600 Broadway, Room 111, San Antonio, Texas

FOR SALE—3500 TONS
PORTABLE STEEL IRVING GRID AIRFIELD OR ROAD MATS
Ideal on sand, dirt or mud
Will be sold in any quantities
Rail and Barge Shipping Facilities
ALTER CO., Davenport 12, Iowa

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE
COMPLETE COMPRESSOR STATION

Two 600 H.P. Type L.V.G. Ingersoll Rand gas engines with high pressure compressors. Engines and compressors complete including Parkersburg Building. Located twenty miles from Houston. Contact—

PETROLEUM MANAGEMENT CO.
565 San Jacinto Building, Houston, Texas
Phone: CHarter 4781

EQUIPMENT FOR SALE

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

REDA PUMP complete w/ #4—20 Motor, 45½ H.P., 650 Volt, 41.6 Amps. #90—Pump Housing. #5595—Switchboard w/recording Ammeter 3400'—#4 Cable 125 Amp. Auto Transformer Accessories. Engine 225 H.P. Climax Type R-225 on Skid. Alternator G. E. 125—KVA, 100 KW, 440 V. A. C. w/Transformer, Flexible coupling and skid base. House—10' x 18' wood frame, w/G.I. Roof and Siding on Skid. Engine—165 Hp. Climax R-61 on Skid. Herndon Drilling Co., 421 Mayo Bldg., Tulsa, Phone 4-9700.

GAS METERS, Westcott, Foxboro and Emco. Good condition and can furnish most any type or capacity. Geo. R. Milner, Okmulgee, Oklahoma.

250,000 FT. 8⅝ o.d. pipe with collar and plain end. $1.00 per foot Oklahoma. Rogers & Lindquist, 620 Wright Building, Tulsa Okla. Phone 3-2072—5-8850.

FOR SALE: Electric Generator Units: One Caterpillar Diesel D8800 with 50 KW Generator, at Garnett, Kansas—$6,000.00. One 350 HP. L3000 LeRoi Engine with 175 KW Columbia Generator at Hays, Kansas—$10,000.00. For further information, contact Joe A. Huitt, Deep Rock Oil Corp., Box 1051, Tulsa, Okla.

USED EXCELLENT CONDITION IN OPERATION

One Each (4¾" to 1") (13⅜" to 4½") LANDIS Leadscrew Receding Head Pipe Threading and Cutting Machine Motor Driven.

OILFIELD SALVAGE CO., INC.
Phone CHarter 6914
P. O. Box 2589 Houston

HEATER

Slightly used O'Neill Tank Co. 4' x 5' double jacket heater with regulator and controls. New Price $1,080.00—Asking $900.00. Write:

HILLTOP OIL CO.
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PACKAGED GAS DESULFURIZATION UNITS

All sizes for pipe line and fuel gas requirements.

WRITE—WIRE—PHONE

GRAFF ENGINEERING CO.
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Dallas, Texas
Phone Justin 2153

EQUIPMENT FOR SALE

MODEL H CARDWELL servicing unit with mast. Truck mounted. Fully equipped. Now operating in Central Kansas. Box G-823, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Failing Model 1500 drilling equipment. Have available for sale several drills exceptionally complete and in excellent condition. Particularly suitable for water well or deep core work. This equipment relatively new and now operating. Substantial savings possible. Box G-738, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: On our O'Brien "E" lease, south of Liberty, Texas, one used Wilson Supply - Ingersoll - Rand Type ES, 4⅛" X 2¾" X 7" 2 stage portable packaged compressor unit, driven by Waukesha engine, Model 6SRKRU new June 50. Price $5500.00. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: (To settle estate) Complete Rotary Drilling Rig—U15 Unit Rig Draw Works with two MF66 Murphy Diesel Drive, 7¼ by 14 Emsco Pump, 96' Lee C. Moore Mast. Excellent Condition. Mrs. W. D. Kelley, Pampa, Texas.

EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Pressey & Son, Pueblo, Colorado.

2 HYDRAULIC pipe pulling units mounted on half track, one on tandem trailer. A. C. Duncan, 532 North Cheyenne, Tulsa, Oklahoma.

FOR SALE: Approximately 3300' of 2" tubing, approximately 3300' of 2⅛" tubing, approximately 6700' of ⅝" rods, approximately 6000' of 5½" J-55 14# casing, 2 tanks, heater, settling tank and fittings. 1 Lufkin T5A-16 Pumping Unit w/1 FM ZC-346 Engine. Contact Thos. J. Carter, 112 Landa Building, 5738 N. Central Expressway, Dallas, Texas. Telephone VI-2547. All this equipment located near Holdenville, Oklahoma.

BROWN 100" and 25", 1000# wp Square Root, 1-10 liquid or gas flow meters, used, less mercury, $175.00 ea. W. J. Stroud, Bel Oil Corporation, Elton, Louisiana.

FOR SALE: 5—Shriver 42"x42" cast iron Filter Presses, Plate & Frame Type, 27, and 54 chambers 1" cake; 15—Sperry 18"x18" cast iron Filter Presses, 11 chambers; #12 Sweetland Filter for 72 monel covered leaves on 2" centers. Immediate shipment. Attractively priced. Consolidated Products Co., Inc., 17-20 Park Row, New York 38, N. Y. BArclay 7-0600.

FOR SALE: Complete refrigeration type propane recovery plant for sale near Snyder, Texas. Capacity—25,000 MCF per day gas at 450# gauge; 30,000 gallons per day propane. Gas Products Development Corporation, 201 Oil Capital Building, Tulsa, Oklahoma.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

EQUIPMENT WANTED

NOTICE: We buy, We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

HELP WANTED

SEISMIC SUPERVISOR required by expanding and aggressive seismic contracting company. Should have ability to supervise any domestic area and have good professional contacts. Minimum requirements: college degree in geophysics or related fields and eight years' seismic experience. Good future. Tulsa location. Box G-705, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

SEISMIC PARTY CHIEF

Have position for experienced man with degree in geophysics, geology or engineering with minimum of 3 years experience in record interpretation and field party management. Salary range from $7,000.00 to $10,000.00 per year plus annual bonus and is dependent upon experience and qualifications. Our company is small, relatively young and has ample opportunity for individual advancement. Principal area of operations, West Texas and New Mexico. Write

Box G-825
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

OIL INDUSTRY Employment Service, 405 Tuloma Bldg., Tulsa, Okla. Suggest you file resume of your education and experience with us.

CHIEF CHEMIST experienced in Pod column work and gasoline plant process and product control testing to take charge of laboratory located at large gasoline plant in West Texas. Housing furnished and salary to be commensurate with qualifications of applicant. Please furnish experience record and salary expected. Our employees have been notified of this advertisement. Box G-776, The Oil and Gas Journal, Tulsa Oklahoma.

SALES ENGINEER — geology background preferable, but not necessary. Locations in Dallas and Fort Worth area and in Houston. Reputable well logging company. Guaranteed $300 per month drawing account plus commission and traveling expenses. Should make $1500 per month easily. Box G-818, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER
Up to $10,000

Graduate Engineer Preferred

Experienced in Plant Instrumentation or related fields.

Interviewing and moving expenses, plus our fee, all paid by Company.

Send complete and up-to-date resume to—

CHAS. J. LOVELESS PERSONNEL SERVICE
Suite 616 South Main—Tulsa, Oklahoma

MIDWEST FABRICATOR

(1) SENIOR DESIGN ENGINEER—5 years or more experience
(1) ESTIMATOR —5 years or more experience
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We are a large steel fabrication company in business over 35 years, specializing in the design and manufacture of welded pressure vessels, structural steel and heavy plate work. Due to our new expansion program, we are in need of the above type men. These are permanent positions with excellent salaries and opportunities for advancement. If you are qualified, please write, giving detailed resume of education and experience to Box G-828, The Oil and Gas Journal, Tulsa, Oklahoma. All replies will be held confidential.

DEERE & COMPANY

Now staffing engineering and research department for new petrochemical project located at Pryor, Oklahoma. The following professional positions are open—

CHEMICAL ENGINEERS—For process development, process design, economic evaluation, and technical service to plant operations. Should have B. S. or M. S. in chemical engineering and 5-10 years experience in design and operation of chemical process plants.

SUPERVISING RESEARCH CHEMIST—Will be responsible for organizing and directing applied research group in fields of agricultural and organic chemicals. Research will be directed toward development of new processes for product upgrading and diversification. Should have advanced degree in chemistry or chemical engineering and 5-10 years industrial research experience.

RESEARCH CHEMIST—For process research on agricultural and organic chemicals. B.S., M.S., or Ph. D. in chemistry and 3-10 years industrial research experience in related fields.

CHIEF CONTROL CHEMIST—Will be responsible for setting up plant analytical control group. Should be graduate chemist with 5 or more years of experience in analytical control work including supervision. Infra-red spectrophotometer experience desirable.

Exceptional opportunity to advance in newly formed chemical division of well established farm machinery manufacturing company. Plant now under construction to produce ammonia and urea from natural gas. Please send resume and salary requirement to:

W. W. Yeandle, Works Manager
Grand River Chemical Division of Deere and Company
Pryor, Oklahoma

Your letter will receive prompt action and will be held in strict confidence.

HELP WANTED

ENGINEERS, Executives, Technical Men Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 434 Frick Bldg., Pittsburgh 19, Pa.

PETROLEUM OR
RESERVOIR ENGINEER

For New York office of major foreign producer. Proficient in mathematics with 4 or more years' extensive experience in oil and gas reservoir engineering on primary and secondary recovery problems. Duties will include preparations of basic field production and reservoir data for application in analogue and digital computors, performance of analytical analysis of field behavior and interpretation and preparation of resulting data for reservoir engineering reports on specific fields.

Write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OG-6
Arabian - American
Oil Company

505 Park Avenue
New York 22, N. Y.

SITUATIONS WANTED

C.P.A. DESIRES position as controller, treasurer, office manager, with oil company or related organization. 24 years extensive, diversified experience with oil industry, including producing, refining, and marketing. Public accounting and tax background. Presently employed in managerial capacity. Middle 40's, married, will relocate. Resume on request. Box G-831, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST-GEOPHYSICIST, 13 years foreign experience. Last 7 in Venezuela as Chief Geophysicist for major company. Experienced in exploration economics and evaluations. Preferably interested employment U.S. or Canada. Box G-830, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER, age 40, fifteen years' experience in the operation and design of Gasoline Plants, Refineries and Petro-Chemical Plants, specialized in the design and operation of high purity ethylene plants. Desires responsible position with a progressive Oil Company. Box G-791, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628, Ph. No. 3-3141, Hobbs, New Mexico.

ACCOUNTANT, oil production and heavy industrial experience. Box G-824, The Oil and Gas Journal, Tulsa, Oklahoma.

AVAILABLE, Construction Superintendent. Roads, bridges, harbor work, plant erection, prefer foreign contract. Write Walkinshaw, Room 506, 373 Bay Street, Toronto.

PIPING ENGINEER, controlling piping design, specifications, take off, equipment approval, for U. S. oil company in Germany; seeks position anywhere. 12 years experience ASA, German, British & French piping standards. Age 31, married. Box G-829, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST: Twenty years experience. Consider full, part time or retainer and interest basis. Prefer Oklahoma. 2848 Northwest 20th Street, Oklahoma City, Oklahoma.

CHEMICAL ENGINEER, 28, 5 years refinery engineering and operating experience. Desires engineering or supervisory position with refinery, petrochemical or engineering organization. Box G-826, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

Wanted

GAS and OIL PRODUCTION

Principals seek to acquire or buy into

SETTLED and ECONOMICALLY SOUND GAS and/or OIL PRODUCTION

Send information, including reserves, life expectancy of field and asking price to—

Box G-832

The Oil and Gas Journal

Tulsa, Oklahoma

PRODUCTION PROPERTY WANTED

WANTED
TO BUY
OIL PAYMENTS, ROYALTIES AND PRODUCING PROPERTIES

Several of the Southwest's outstanding philanthropic institutions want to purchase oil payments, royalties, or producing properties of any size on a favorable basis to the seller. If your year-end, general tax, or financial plans indicate such a sale, send complete data and information to

Box G-807, The Oil and Gas Journal,
Tulsa, Oklahoma

ELECTRICAL CONTRACTORS

Office Phone 5-5315 — Res. Phone 7-4550

W. L. RATCLIFF COMPANY
ELECTRICAL CONTRACTORS
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W. L. Ratcliff, P. O. Box 373 — 506 Caddo St., Shreveport, La.

REAL ESTATE

FOR SALE: Nine room house on highway near Floresville. All utilities. Recently remodeled. Many liveoak trees. Phone Helen Pickett, Floresville, Texas.

FOLLOW THE BOOM in uranium used for atom bombs. I offer 30 claims near Uravan, Colorado, for $2,000 each for immediate sale. Dyer, 1835 Champa, Denver, Colorado.

ODESSA WAREHOUSE SPACE AVAILABLE

Located in center of town just off Highway 80. Up to 1600 sq. ft. available. Joint tenancy. Can be arranged with telephone answering and warehouseman service.

STENTZ EQUIPMENT COMPANY
P.O. Box 3367 — Phone: 8-3388
Tulsa, Oklahoma

ROYALTIES

OFFERING CHOICE ROYALTIES on geology in Oklahoma's greatest oil fields. A. S. Berry, 522 Wright Bldg., Phone 5-5402, Tulsa, Oklahoma.

WILL SELL nonproducing royalty, 660 from Devonian test now being drilled in Lea County, N. M. Contact Mrs. Fannye Holloway, 819 North Thorpe, Hobbs, N. M. Telephone 3-2748.

FREE TAX INFORMATION for those desiring to sell their producing royalties, overrides or production. Robert L. Kinkaid, Box 28, Tulsa, Oklahoma.

WANTED
TO BUY
OIL PAYMENTS, ROYALTIES AND PRODUCING PROPERTIES

Several of the Southwest's outstanding philanthropic institutions want to purchase oil payments, royalties, or producing properties of any size on a favorable basis to the seller. If your year-end, general tax, or financial plans indicate such a sale, send complete data and information to

Box G-807, The Oil and Gas Journal,
Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

160 ACRES wheat land, Twp. 163, Range 95, Divide County, North Dakota. $15,000, or ½ mineral rights $8,000. 4118 Cedar Avenue, Minneapolis, Minnesota.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SEE A. L. Bowles, Rollow Building, Ada, Oklahoma, for drilling deals.

WILL CONSIDER DEVELOPMENT and exploration of large acreage lease. Must be of considerable acreage, or not interested. Box 22, Emmaus, Pa.

FOR SALE: Three leases, Dutcher sand near Tulsa. Eleven Well, Nine Barrel daily. $20,000.00. No Brokers. Box G-817, The Oil and Gas Journal, Tulsa, Oklahoma.

CANADIAN LEASES: 10,000 acres British Columbia, open for offers—Quarter Section Pincher Creek area Alberta. Price $10.00 acre—2% Gross Royalty. Quarter Section Red Deer and Clive area Alberta. $1,000.00 per 1%. Box G-827, The Oil and Gas Journal, Tulsa, Oklahoma.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6535 Delmar Ave., St. Louis 5, Mo.

LEGAL

The Nevada Oil and Gas Conservation Commission will conduct a public hearing relative to the adoption of state-wide rules and regulations of the Commission on Tuesday, December 29, 1953, at 10:00 a.m., in the Executive Chamber, State Capitol, Carson City, Nevada. Persons wishing advance copies of the proposed rules and regulations may obtain them by writing the Commission at Box C, University Station, Reno, Nevada. Joseph Lintz, Jr., Secretary.

WILDCAT COMPLETIONS

(Continued from page 375)

16/64-in., 40°, TD 4,134 ft. (Oil discovery.)

Marshall County: Leo Oil Co. 1 Junkins, NW SW NW NW 16-5s-5e. Dry. TD 745 ft.

McClain County: K. A. Ellison 1 Johnson "A," C SE SW 2-8n-4w. IPF 333 BOPD, Bromide sand 10,120-170 ft., 15/64-in., 36.5° gravity. TD 11,022 ft. (Oil discovery.)

Osage County: Halbert & Evans 1 Osage, SE SE NW 10-26n-7e. Dry. TD 2,721 ft.

KANSAS

Decatur County: Sauvage & Dunne 1 State Lake, NW SW NE 32-2s-28w. Dry. TD 4,100 ft.

Ellis County: The Texas Co. 1 Dortland, NE SW NE 14-13s-16w. Dry. TD 3,512 ft.

Graham County: Berwick Drilling Co. 1 Fox, SW SW SE 30-7s-24w. Dry. TD 4,360 ft.

Marion County: Rex & Morris 1 Krauss, SW SW SW 24-19s-4e. Dry. TD 2,640 ft.

Pawnee County: Vickers Exploration 1 English, NE SE NW 1-21s-15w. Dry. TD 3,620 ft.

Graham Meseman Rinehart 1 Aldridge, SE SE NW 3-23s-15w. IP 1,458 BOPD, Lansing-Kansas City 3,705-10 ft. TD 4,099 ft. (Opens Shady Southwest pool.)

Pratt County: Rine Drilling Co. et al 1 Gereke, SW NE SE 12-26s-15w. IP 3,000 BOPD, Viola 4,376-97 ft. TD 4,594 ft. (Opens Gereke pool.)

Rawlins County: Natural Gas & Oil and Ashland Refining Co. 1 Lewis "A," SE SE SW 19-3s-32w. Dry. TD 4,666 ft.

Stafford County: Greenland Drilling Co. 1 Holmes, W½ SW NW 13-24s-13w. Dry. TD 4,112 ft.

M&L Oil Co. 1 Fuller, NE SE NW 4-25s-11w. Dry. TD 3,910 ft.

Sumner County: Rocket Drilling Co. 1 George, NE SW SE 27-33s-1e. Dry. TD 4,065 ft.

Wichita County: Rooney Siegfried & Thomas 1 Lindberg, SW SW SW 12-17s-37w. Dry. TD 4,980 ft.

NEBRASKA

Cheyenne County: Roden Darden & McRae 1 Rienka, SW SE SW 7-12n-52w. Dry. TD 5,558 ft. "J" sand 5,412 ft.

Shorts field: Russell P. Johnson 1 Shorts, NW SE SE 17-13n-51w. IPP 120 BOPD "D" sand discovery—new field. "J" sand 4,944 ft. OTD 4,997 ft.

CALIFORNIA

Butte County: Sunray Oil Corp. 1 Justeson, 21-17n-2e. Dry. TD 5,404 ft.

Fresno County: R. S. Rheem, Opr. 1 Continental-Zwang, 14-20s-15e. Dry. TD 7,925 ft.

Kern County: P. A. Doheny B-77 Derby, 33-30s-29e. Dry. Santa Margarita 4,952 ft., TD 5,005 ft.

Gilliland Oil Co. et al 1-A Alferitz, NW NE 10-25s-18e, IPP 60 BOPD, 15° gravity, perfs. 100-130 and 397-600 ft. in Escudo sand of Miocene, OWWO, TD 2,512 ft., PB 600 ft. (New pool discovery northwest of Devils Den field.)

Richfield Oil Corp. 67-29 C.L.A., SW SE 29-30s-25e, IPF 119 BOPD, 43° gravity, later increased to 57°-condensate, 70 BPD, 1,780 M.c.f. gas, 16/64-in. choke, perfs. 17,497-17,892 ft., TD 17,895 ft. (New Eocene sand discovery in North Coles Levee field, world's deepest producer.)

Vanray Oil Co. 1 U. S.-Seaboard, 22-28s-28e. Dry. TD 2,746 ft.

Kings County: W. W. Holmes, Opr. 1 Wink-

ler, SW SW 28-23s-22e, IPF 2,000 M.c.f. gas, ½-in. choke, perfs. 2,798-2,800 ft., TD 3,400 ft., redrilled TD 2,901 ft. (Gas discovery 1 mile southeast of Alpaugh field.)

Los Angeles County: Bender Oil Operations 1 Mayo, 30-2s-10w. Dry. TD 6,785 ft.

Richfield Oil Corp. 1 Pertusati, 20-2n-16w. Dry. TD 4,578 ft.

T. F. Vander Laan, Opr. 1 Vander Laan, 30-2s-10w. Dry. TD 4,315 ft.

Solano County: Shell Oil Co. 1 Unit C, 7-4n-1e. Dry. TD 4,295 ft.

Tulare County: M. H. Stone 1 Overland-Stone, 10-19s-23e. Dry. TD 1,122 ft.

NORTH DAKOTA

Pembina County: Turner Oil 1 Holmes, C SE NE 8-163n-55w. Dry. TD 1,393 ft. Winnipeg 1,190 ft.

SOUTH DAKOTA

Corson County: Youngblood & Youngblood 1 Williams Macheel, C SW SW 8-21n-19e. Dry. TD 5,822 ft. Lodgepole 5,600 ft.

MONTANA

Garfield County, Snowbelt: Murphy Corp. 1 NPRR, C NW NE 23-15n-34e. Dry. TD 6,810 ft. Charles 6,114 ft.

Petroleum County, Brush Creek: Ike Taylor 1 Skibbey 26-16n-27e. Dry. TD 2,150 ft. Lower Amsden 1,838 ft.

WYOMING

Converse County, Antelope Creek area: Union Oil & Brazos 1 Moore Sheep Co., Lot 1 (NE NE) 4-40n-76w. Dry. TD 13,624 ft. Shannon 10,450 ft.

Natrona County, Cottonwood area: The Texas Co. 1 Government, Coffman, NW NE NE 15-38n-86w. Dry. TD 1,923 ft. Madison 1,867 ft.

Niobrara County, Pine Lodge: Crusader Corp. 1 Government, 330 S N 660 W/E Lot 3 6-35n-63w. Dry. TD 4,148 ft. Dakota sand 4,110 ft.

Washakie County, Murphy dome: Hancock Oil 1 Government, C NW NW 35-44n-92w. Dry. TD 5,251 ft. (?). Tensleep 5,215 ft.

South Fork: Hunt Oil Co. 1 Blanche Hawks Government, C NE NE 22-46n-92w. Dry. Dakota 9,070 ft. 10,167 ft. TD. (?).

Frison Dome: Houston Oil of Texas 1 Government, C NW SW 14-48n-91w. Dry. TD 5,460 ft. (?). Tensleep 5,429 ft.

Weston County, N. W. Dewey area: C. G. Glascock-Cosden Petroleum 1 State, NE NE NW 36-42n-61w. Dry. TD 2,745 ft. 1st Leo (?) 2,689-2,703 ft.

New Castle area: Mars Drilling 1 Engel, NE SW SW 31-45n-61w. Temporarily abandoned. TD 1,551 ft. Newcastle 1,231 ft.

UTAH

Uintah County, Agency Draw: Sunray Oil Corp. 1 Utah Corp., NW SW 12-13s-20e (SLM). Dry. TD 7,316 ft. Mancos 7,222 ft.

COLORADO

Baca County: Southwestern Explor. 1 State, SW SW NE 16-30s-42w. Dry. TD 5,647 ft. Mississippi 5,552 ft.

Grand County, Trail Creek: British-American 1 C Lazy-U-Ranch, C E½ SE NE 3-2n-77w. Dry. TD 4,629 ft. Pre-Cambrian 4,587 ft.

Logan County: Lowell & Daniels 1 Nora Smith C-36, SE NE NW 29-7n-54w. Dry. TD 5,282 ft. "J" sand 5,121 ft.

Plains Exploration 1 Art Edens, SW SW SE 14-8n-54w. Dry. TD 5,255 ft. "J" sand 5,099 ft.

Falcon Seaboard 1 Duncan, NW NW SE 28-8n-54w. Dry. TD 5,271 ft. "J" sand 5,108 ft.

Morgan County: Dee Miller and George S. Engle 1 Clem S. Lee, NW NE NW 30-3n-56w. Dry. TD 5,620 ft. "J" sand 5,433 ft.

Washington County: Alfred Ward & Son 1 Gebauer, NW NW SE 5-1n-53w. Dry. TD 5,014 ft. Skull Creek 4,768 ft.

EQUIPMENT MEN

Muldrow Transfers Dave Swenson to Midland

Muldrow Aerial Surveys Corp. announces transfer of Resident Engineer Dave Swenson from Oklahoma City to offices in Midland, Tex. Swenson will be engaged in local engineering problems relating to mapping and maintenance of the large library of controlled regional base maps.

A map-engineering specialist, Swenson has been regional engineer for Oklahoma City offices of Muldrow for the past year.

Crosby Named Advertising Manager of Crouse-Hinds

John B. Crosby, formerly assistant manager publicity, has been named advertising manager, Crouse-Hinds Co., Syracuse. With Crouse-Hinds for 11 years, Crosby began as a member of the home-office sales organization, later transferred as resident representative to Richmond, Va. In 1944 he returned to Syracuse as assistant to the sales manager, before joining the advertising department in 1951.

Crouse-Hinds manufactures explosionproof electrical equipment.

Engineering Director Named

Appointment of Charles W. Punton as director of engineering of Mine Safety Appliances Co., Pittsburgh, has been announced by George H. Deike, Jr., vice president.

Punton has been with the company since 1929. He started as an industrial engineer and in 1941 was named works manager. A graduate of University of Kansas, he also received M.S. and I. E. degrees from University of Pittsburgh.

American Iron Announces Additions to Sales Staff

American Iron & Machine Works Co., of Oklahoma City, has announced the addition of the following men to its sales force: Charles McMullen will represent American in the South Texas area and will make his home in Victoria. Bill Rogers will represent American in the Illinois area. K. E. Woods will make his headquarters in Denver and will serve the states of Colorado and Utah. B. R. Foster will serve the Oklahoma territory and will specialize in the sales of production packers.

C. McMULLEN

BILL ROGERS

Prior to coming to American Iron, McMullen was affiliated with United Supply Co. and Houston Oil Field Materials Co.

Rogers was previously in sales work with Sohio Oil Co. and Reed Roller Bit Co. His headquarters will be in Mount Vernon, Ill.

K. E. WOODS

B. R. FOSTER

Woods was formerly with Reed Roller Bit and Chicago Pneumatic Tool Co.

Foster was formerly with McEvoy Manufacturing Co., Gates Rubber Co., and Continental Supply Co. His headquarters will be in Oklahoma City.

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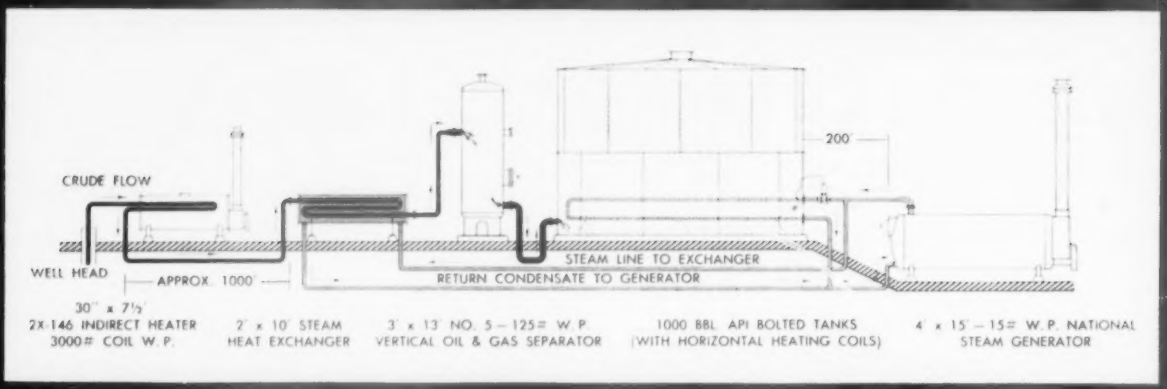
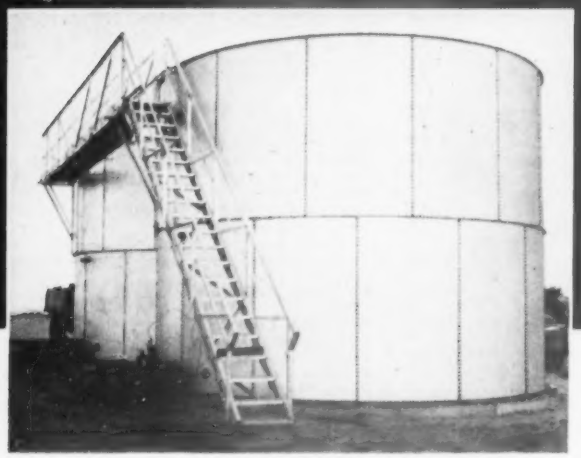
PRODUCTION PROBLEM SOLVED IN UINTAH COUNTY NEAR VERNAL, UTAH

Problem — To handle 240 barrels per day of 37-degree gravity oil with a pour point of 90-degrees.



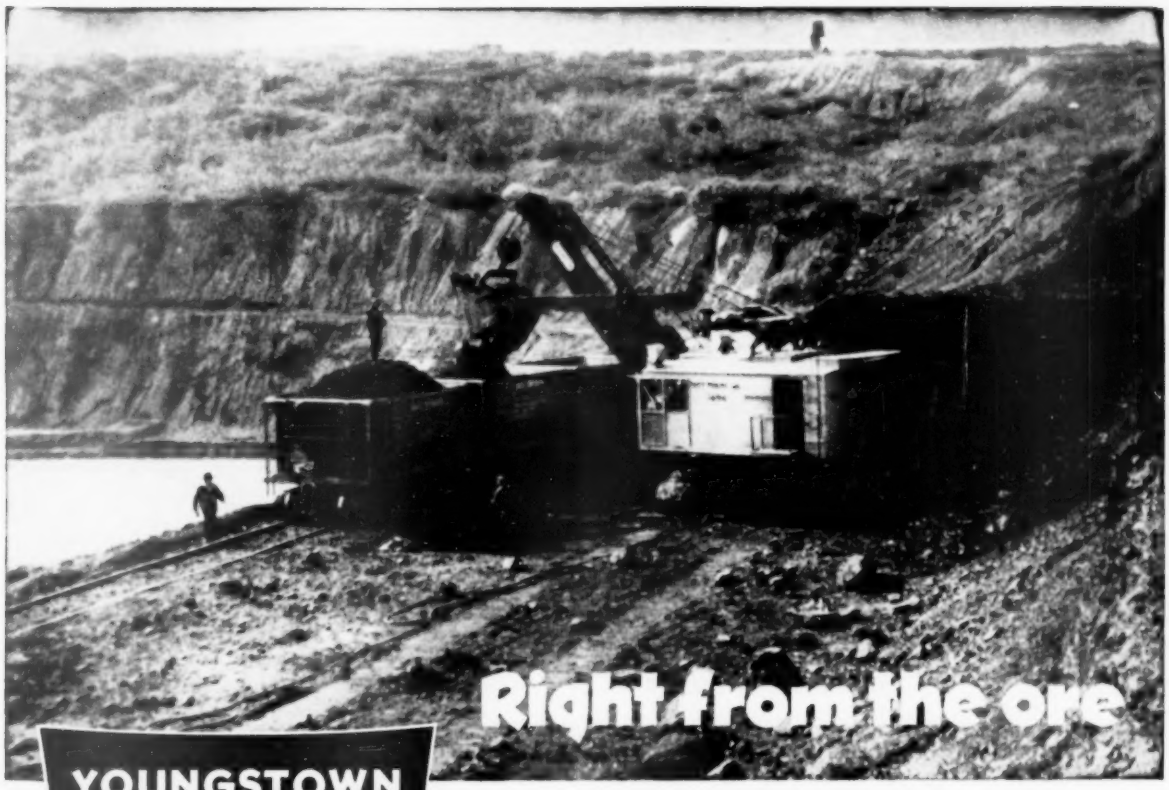


Solution — National Tank Company equipment is set as per the above flow diagram. An indirect heater is set at each well head for a flow line heater in order to keep production at a high enough temperature to prevent congealing in the lines. Before separation, the production is subjected to an additional heat through a Steam Heat Exchanger so that gas can properly be separated from the oil in the oil and gas separator. Each tank is thermostatically controlled at a temperature of 110° preparatory to being shipped by truck as there is no pipeline connection available at present time. A 4' x 15' two million BTU 15# W. P. National Steam Generator is installed along with coils in each tank to keep the production to 110-degrees in the stock tanks. This is a closed system with the generator set at a lower level than the tank grades and the condensate line buried from the tanks back to the unit. Atmospheric temperatures in this area range sometimes as low as 40° below zero in the winter months.

It's a National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA



YOUNGSTOWN
Electric Weld
LINE PIPE

Uniformly satisfactory in service because—

Long lengths save time and trouble

Weldability is outstanding

It bends readily

Line up characteristics are excellent

QUALITY YOUNGSTOWN SERVICE

RIGID QUALITY CONTROL

●One important reason why Youngstown Electric Weld Pipe is so uniformly satisfactory is that its production is under the sole supervision of a single integrated organization—from mining the ore to shipping the finished product.

Youngstown Electric Weld Pipe for the oil and gas industry is being made in sizes up to 22" OD and in grades as high as X52. For further information, phone or write our nearest District Sales Office.

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

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Christmas tour

Lights will be burning on thousands of drilling rigs this Christmas. Once the drill starts "turning to the right" it is seldom stopped for the holidays. That is the accepted tradition of this 'round-the-clock, 'round-the-year industry.

And as the year draws to a close, the rotary drilling industry will have set a new record for the total footage and number of wells drilled in a given year. Made without fanfare, this record stems from the increased skill of drilling crews, the development and improvement of new drilling techniques and tools.

At this Christmas time Hughes Tool Company salutes the entire industry for its achievements of 1953.